

## **INLAND FISHERIES- SCOPE AND PRESENT STATUS**

Inland fisheries are any activity conducted to extract fish and other aquatic organisms from "inland waters". The term "inland waters" is used to refer to lakes, rivers, streams, ponds, inland canals, dams, and other land-locked (usually freshwater) waters. Whilst most inland waters are freshwater (i.e. zero salinity), there are many areas that are classified nationally as inland waters which have daily or seasonal fluctuations in salinity (e.g. estuaries, deltas, some coastal lagoons). Some areas are permanently brackishwater or even hypersaline.

Fisheries in inland waters have long provided an important source of food for mankind. The global population now stands at 7.6 billion and is projected to rise to 9.7 billion people by 2050.

Inland capture fisheries have an important role to play in the global challenge to sustainably feed this growing population, as they deliver quality nutrition to some of the world's most vulnerable populations in a manner that is both accessible and affordable.

Inland fisheries are critical for a group of developing countries in the world, providing an important source of nutrition, food security as well as micronutrients. These nutritional and food security benefits are an integral part of the agricultural landscape of these countries, thus inland fisheries are closely linked to food production, water and land management, biodiversity and ecosystems.

Inland fisheries are also increasingly impacted and changed as countries develop their water and land resources for agriculture. They are under increasing pressure and threats arising from far reaching changes to the aquatic environment arising from human activities such as damming, navigation, wetland reclamation for agriculture, urbanization, water extraction and transfer, and waste disposal.

### **Present status inland fisheries of the world**

- Global catches in inland waters accounted for 12.5 percent of total capture fisheries production.
- Inland water catches are more concentrated than marine catches, both geographically and by country. Sixteen countries produced more than 80 percent of the total inland catch, with Asia accounting for two-thirds of global inland production since the mid-2000s.
- In 2018, world aquaculture fish production reached 82.1 million tonnes, 32.4 million tonnes of aquatic algae and 26 000 tonnes of ornamental seashells and pearls, bringing the total to an all-time high of 114.5 million tonnes.
- In 2018, aquaculture fish production was dominated by finfish (54.3 million tonnes – 47 million tonnes from inland aquaculture and 7.3 million tonnes from marine and coastal aquaculture), molluscs, mainly bivalves (17.7 million tonnes), and crustaceans (9.4 million tonnes).
- Inland aquaculture produced most farmed fish (51.3 million tonnes, or 62.5 percent of the world total), mainly in freshwater, compared with 57.7 percent in 2000.

- The share of finfish production decreased gradually from 97.2 percent in 2000 to 91.5 percent (47 million tonnes) in 2018, while production of other species groups increased, particularly through freshwater crustacean farming in Asia, including that of shrimps, crayfish and crabs.

(Courtesy: FAO, Annual report,2020)

**TABLE 1**  
**WORLD FISHERIES AND AQUACULTURE PRODUCTION, UTILIZATION AND TRADE<sup>1</sup>**

	1986–1995	1996–2005	2006–2015	2016	2017	2018
	Average per year					
	<i>(million tonnes, live weight)</i>					
<b>Production</b>						
<b>Capture</b>						
Inland	6.4	8.3	10.6	11.4	11.9	12.0
Marine	80.5	83.0	79.3	78.3	81.2	84.4
<b>Total capture</b>	<b>86.9</b>	<b>91.4</b>	<b>89.8</b>	<b>89.6</b>	<b>93.1</b>	<b>96.4</b>
<b>Aquaculture</b>						
Inland	8.6	19.8	36.8	48.0	49.6	51.3
Marine	6.3	14.4	22.8	28.5	30.0	30.8
<b>Total aquaculture</b>	<b>14.9</b>	<b>34.2</b>	<b>59.7</b>	<b>76.5</b>	<b>79.5</b>	<b>82.1</b>
<b>Total world fisheries and aquaculture</b>	<b>101.8</b>	<b>125.6</b>	<b>149.5</b>	<b>166.1</b>	<b>172.7</b>	<b>178.5</b>
<b>Utilization<sup>2</sup></b>						
Human consumption	71.8	98.5	129.2	148.2	152.9	156.4
Non-food uses	29.9	27.1	20.3	17.9	19.7	22.2
Population ( <i>billions</i> ) <sup>3</sup>	5.4	6.2	7.0	7.5	7.5	7.6
Per capita apparent consumption ( <i>kg</i> )	13.4	15.9	18.4	19.9	20.3	20.5
<b>Trade</b>						
Fish exports – in quantity	34.9	46.7	56.7	59.5	64.9	67.1
<i>Share of exports in total production</i>	34.3%	37.2%	37.9%	35.8%	37.6%	37.6%
Fish exports – in value ( <i>USD billions</i> )	37.0	59.6	117.1	142.6	156.0	164.1

<sup>1</sup> Excludes aquatic mammals, crocodiles, alligators and caimans, seaweeds and other aquatic plants. Totals may not match due to rounding.

<sup>2</sup> Utilization data for 2014–2018 are provisional estimates.

<sup>3</sup> Source of population figures: UN DESA, 2019.

(Courtesy: FAO, Annual report,2020)

## Present status of Inland Fisheries in India

India's inland fisheries resources are as diverse as they are plentiful, comprising rivers, floodplains, estuaries, mangroves, estuarine impoundments, lagoons, upland lakes, reservoirs and ponds (Table 3.2). In India, inland fisheries is classified as follows: freshwater aquaculture, including the pond culture of carp; brackishwater aquaculture, involving mostly shrimp culture; and capture fisheries in rivers, estuaries, lakes, reservoirs, etc.

<b>Resource</b>	<b>Size</b>
Rivers and canals	173 287 km
Swamps and other wetlands	1 097 787 ha
Floodplain lakes	202 213 ha
Upland lakes	72 000 ha
Mangroves	356 500 ha
Estuaries	285 000 ha
Lagoons	190 500 ha
Reservoirs	3 153 366 ha
Freshwater ponds	2 254 000 ha
Brackishwater ponds	1 235 000 ha

- The country's major and minor rivers along with their tributaries, minor streams, creeks and all other microlotic systems have an estimated combined length of 45000 km. These along with the numerous man-made canals have a combined length of 0.17 million km.
- The Ganga river system and its tributaries have a combined length of 12500 km and the Brahmaputra is 4023 km long.
- The peninsular rivers, Mahanadi, Godavari, Krishna and Cauvery, cover 6437 km while the west-flowing Narmada and Tapti of Western Ghats have a combined length of 3380 km.
- The snow- and rain-fed Himalayan rivers are characterized by complicated flood regimes, a heavy silt load, marked seasonal variability in volume, course shifting and heavy bank erosion. In contrast, the rain-fed peninsular rivers are torrential and have well-defined stable courses, a lighter silt load and, except in the deltas, rocky terrain.
- The catch from rivers does not contribute significantly to the total inland fish production in terms of volume, although a large number of traditional, artisanal fishers make a living on it.
- A substantial part of the Ganga and its tributaries flow through the Indo-Gangetic plains providing the richest source of freshwater capture fisheries in India. The Ganga is also the original habitat of the prized Indian major carp and a major source of riverine carp spawn, which meets 30% of the carp seed requirements of the aquaculture sector.
- Commercial fishery in the upland waters of the Ganga system is virtually non-existent because of exploitation problems, low quantity of small-sized commercial species, inaccessible terrain and poor communication links. The upper reaches of Brahmaputra cross through inaccessible terrain so fishing activity is limited to the middle and lower stretches. Similarly, the headwaters of peninsular rivers pass mainly through rapids, gorges and terrains where fishing activity is limited.

- Commercial fishing is largely restricted to the middle and lower stretches of these rivers. For centuries, all of the river systems of the country have provided a means of livelihood to thousands of fishers.
- The riverine setting, however, is a complex mix of artisanal, subsistence and traditional fisheries with a highly dispersed and unorganized marketing system which frustrates all attempts to collect regular data on fish yield.
- The number of fishers per km of river stretch varied between 3.2 in Narmada and 7.8 in Ganga, the average being 6.5. It is estimated that 190000 fishers are presently engaged in riverine fisheries and the average catch per fisher amounts to a meagre 150 kg/year.
- Over the last few decades, marked alterations in the riverine systems have been detrimental to the fish stocks. The once remunerative capture fisheries no longer exist. Fish yield in middle stretches of the Ganga, which was 50.3 kg/ha/yr during the 1960s, declined to 20.0 kg/ha/yr in 1972 and 6.5 kg/ha in the mid 1980s.
- The average yield of Indian major carp declined from 13.3 to 4.6 kg during the same period. Fishing intensity along river courses varies from stretch to stretch owing to various factors such as:
  1. seasonality of riverine fishing activity;
  2. inconsistent catch composition;
  3. conflicting multiple uses of river water;
  4. aesthetic objections owing to nutrient loading and pollution;
  5. lack of understanding of the fluvial system and unreliable database;
  6. fragmentary and outmoded conservation measures;
  7. lack of enforcement machinery;
  8. inadequacy of infrastructure and supporting services;
  9. defective marketing and distribution systems;
  10. demand according to availability, affordability and palatability; and
  11. socio-economic and socio-cultural determinants.
- 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 have 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.
- 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 29.07 lakh ha, tanks and ponds of 24.14 lakh ha, flood plain lakes and derelict water bodies of 7.98 lakh ha, and brackish water areas of 12.40 lakh 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. in that order.
- There are several wetlands being shared with neighboring 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 fisheries and aquaculture constitute the main components of the fisheries sector in India from production point of view. Aquaculture is practiced in both fresh and brackish waters. Ornamental fish farming although a non-food activity also has a promising future and is likely to contribute to the overall growth of the fisheries sector in the coming years.
- The freshwater aquaculture has emerged as a major contributor overtaking the other sub-sectors in fish production. The inland fishery has grown in absolute terms, but the development in terms of its potential is yet to be realized as the sector is extremely diverse and dynamic.
- The inland resources are in the form of rivers and canals, floodplain lakes, ponds and tanks, reservoirs and brackish water resources offer great opportunities for livelihood development. The public and private investments were minimal for developing it as an instrument of growth in preceding years.
- The country has an estimated 1.2 million hectare (mha) of floodplain lakes and wetlands where fish and fisheries remain a traditional economic activity with tremendous socio-economic impact in the rural sector. The cold-water fisheries resources comprise rivers, streams, lakes, reservoirs with a combined riverine length of 8253 km and 41 600 ha of sprawling lakes and reservoirs. Besides, there are vast sheets of inland saline water bodies lying unexploited in different States of the country, mainly in northern and central India.

## **Inland Aquaculture in India**

- The Inland fishery sector plays a great role in nutritional security and employment potential. Inland Aquaculture have grown in absolute terms, the development in terms of its potential is yet to be realized. The vast and varied resources, that are 2.36 million ha of ponds and tanks and 1.24 million ha of brackish water resources offer great opportunities for livelihood development.
- The sector is also an important source of ancillary jobs for rural population, especially in marketing, retailing, transportation etc. However, the sector remains largely un-organised even today mainly due to scattered and diffused nature of activities.
- The freshwater culture resources in the country comprise 2.36 mha of ponds and tanks. The other resources where fish farming can be undertaken include the floodplains lakes and other natural lakes, reservoirs, irrigation canals and paddy fields. India is basically a carp country with more than 75 percent of the production being contributed by carps alone.
- The other significant contributor in recent is *Pangasius* species. India is now the third largest producer of *Pangasius* in the world after Vietnam and Thailand.

## **Inland fisheries of Tamil Nadu**

- Tamil Nadu has 3.7 lakh hectares of waterspreads suitable for fish culture. It comprises of major reservoirs (52,000 ha.) Big/small Irrigation tanks (98000 ha.), small lakes and Rural Fishery Demonstration tanks (158000 ha.) and Brackishwater areas, swamps, estuaries (63,000 ha.)
- Tamil Nadu is also endowed with rich cold water fishery resources. Apart from this 7400 km length of rivers and canals offer good scope for fisheries development. The Inland Fisheries policy of the state focuses in maximizing the fish production utilizing available inland water resources by adopting scientific freshwater aquaculture management and quality seed production.
- The inland fishery resources of Tamil Nadu yield 0.87 lakh metric tons of fishes. (District wise inland fish production details) The total inland water spread has a potential to yield about 4.5 lakh metric tons. The inland programs initiated are focused to bring additional water bodies for fishery development. In Tamil Nadu the Inland Fishermen population is 1.83 lakhs.

Table 1. Commercially important Cultivable freshwater fishes, prawn and crab

SI.No	Common Name	Vernacular Name (Tamil)	Scientific Name
42	<b>Carps</b>	<b>Carp</b>	
	Catla/ Thick lips	Katla/Thoppa meen/ Japan kendai/ Koora kendai/ Yamaneri kendai/Karavai	<i>Catla catla</i>
	Mrigal	Mrigala/ Gudu kendai	<i>Cirrhinus mrigala</i>
	Grass carp	Pullu kendai	<i>Ctenopharyngodon idella</i>
	Common carp	Carp	<i>Cyprinus carpio</i>
	Rohu	Rogu/ Kennadi kendai	<i>Labeo rohita</i>
	Carnatic carp	Palli kendai/ Sallkendai/ Sihelle	<i>Puntius carnaticus</i>
43	<b>Cichlids</b>		
	Green chromide/ Pearlsport	Sethakendai/ Palincha/ Karassar	<i>Etroplus suratensis</i>
	Orange chromide/ Spotted etroplus	Sellakasu/ Paradi/ Challai/ Boorakas	<i>Etroplus maculatus</i>

	Tilapia	Tilapia/ Jilabi-meen	<i>Oreochromis mossambica/ Tilapia mossambica</i>
44	<b>Climbing perch</b>	<b>Sennal</b>	
	Climbing perch	Sennal/ Panaiyerikendai	<i>Anabas testudineus</i>
45	<b>Snakeheads/ Murrels</b>	<b>Vraal</b>	
	Giant snakehead	Aviri/ Puveral/ Iru vraal	<i>Channa marulius</i>
	Asiatic snakehead/ Bengal snakehead	Parakoravai/ Maniam-korovai/ Pothi meen	<i>Channa orientalis</i>
	Spotted snakehead	Korava	<i>Channa punctatus</i>
	Striped snakehead	Vraal/ Karuppu veral	<i>Channa striatus</i>

	Giant river prawn/ Scampi	Aathu eral/ Scampi	<i>Macrobrachium rosenbergii</i>
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	Mud crab	Pachai nandu/ Kazhi nandu	<i>Scylla serrata</i>
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