III SEMESTER

CAPTURE FISHERIES

(AQUACULTURE MAJOR-COURSE-6 LAB MANUAL)

Dr.SREENIVAS - Dr. CHAKARPANI - Dr. ANIL KUMAR

GOVT. DEGREE COLLEGE
RAMACHANDRAPURAM - 533255
KNOWLEDGE • SKILLS • HUMANITY

శ్రేష్ఠ కళాశాల విడదలూరు
నియతం కురు కర్మత్వం
విద్యా నిమ్మిత ఇహూచేతి
Estd. 1965

S.C.I.M. Govt. College (A)
ESTD 1968
TANUKU - WEST GODAVARI DIST.

CAPTURE FISHERIES

(AQUACULTURE MAJOR-COURSE-6 LAB MANUAL)

Authors

Dr. N. Sreenivas M.Sc.,Ph.D.
Lecturer in Zoology
Government Degree College
RAMACHANDRAPURAM-533 255
Dr. B R Ambedkar Konaseema Dist.

Dr. I. S. Chakrapani M.Sc., Ph.D.
Lecturer in Zoology
PRR & VS Government Degree College
VIDAVALURU- 524 218
SPS Nellore Dist.

Dr. P Anil Kumar M.Sc., Ph.D.
Professor in Zoology & Principal
SCIM Government Degree College (Autonomous)
TANUKU -534 211
West Godavari Dist.

Title of the Book: **Capture Fisheries Lab manual** (Aquaculture Major III semester)
Pages: 18

First Edition - 2024

ISBN: **978-93-341-5755-0**

Publisher: Dr. N Sreenivas
Lecturer in Zoology
Government Degree College
Ramachandrapuram – 533 255

(05 May 1934 – 03 Jun 2024)

In fond memory of

Prof. P. Chandra Mohan. M.Sc., Ph.D.

Professor (Rtd.), Department of Zoology

Andhra university

III SEMESTER
Course No.: 6 - Capture Fisheries
credits :1

PRACTICALS SEMESTER – II

1. Identification of Freshwater fishes based on colour, Pigmentation, morphometric and meristic characters and other characters relavent to the group.
2. Identification of fry and fingerlings of Indian Major Carps.
3. Examination of Commercially Important Freshwater fishes and prawns, from the point of view of ecology and fishery.
4. Knowledge of common types of Freshwater craft and gear on models provided in the department.

Field Work : Visit to fish landing centers of rivers, lakes and reservoirs.

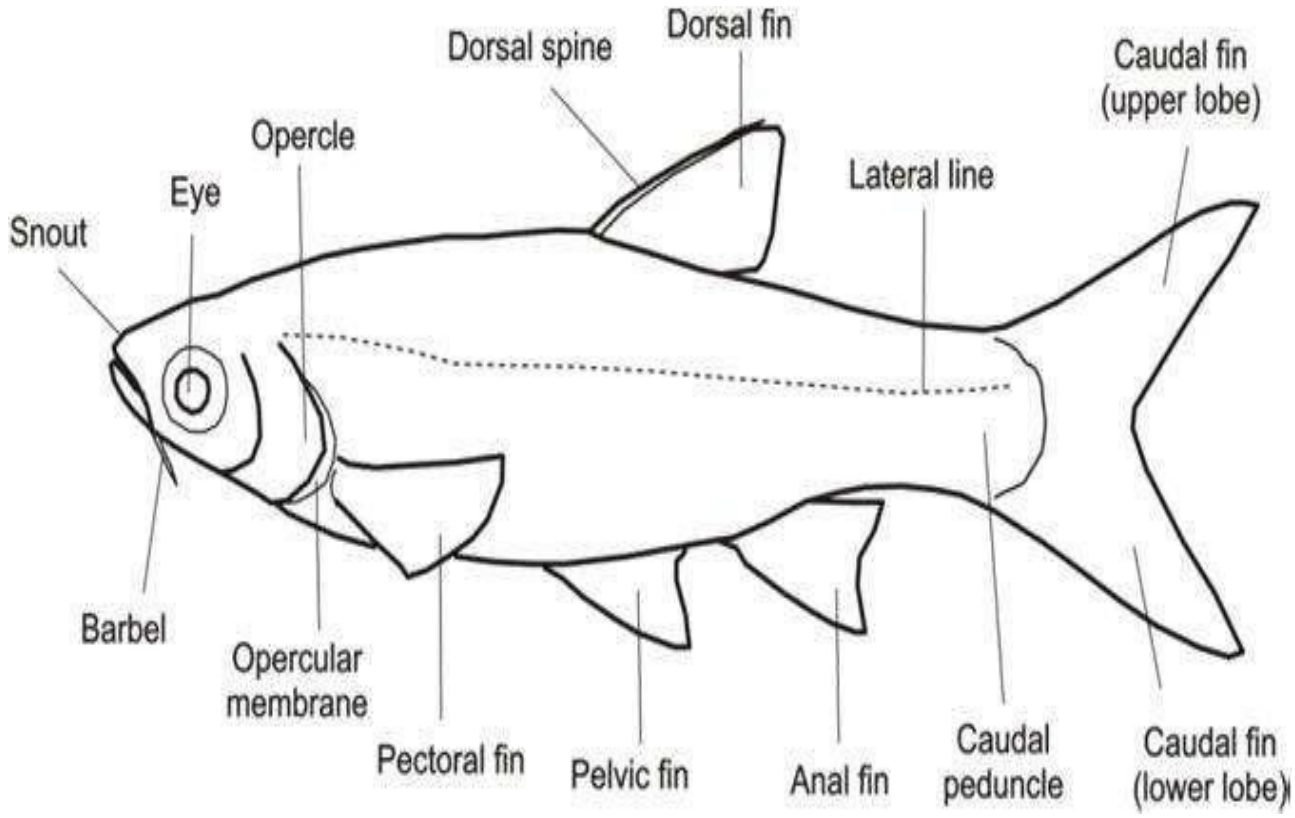
1. Meristic characters of Fin Fish

Meristic characters which are countable have been widely used in studies of fish population and species. Unlike the body proportions or colouration, meristic characters are fixed usually at or before metamorphosis and remain constant throughout the life of an individual.

All the meristic characters should be treated separately and the frequency distribution of meristic characters must be given so as to find out any variation between species or between population of a species.

The following abbreviations are used in fins, scales and gill rakers of a teleost:

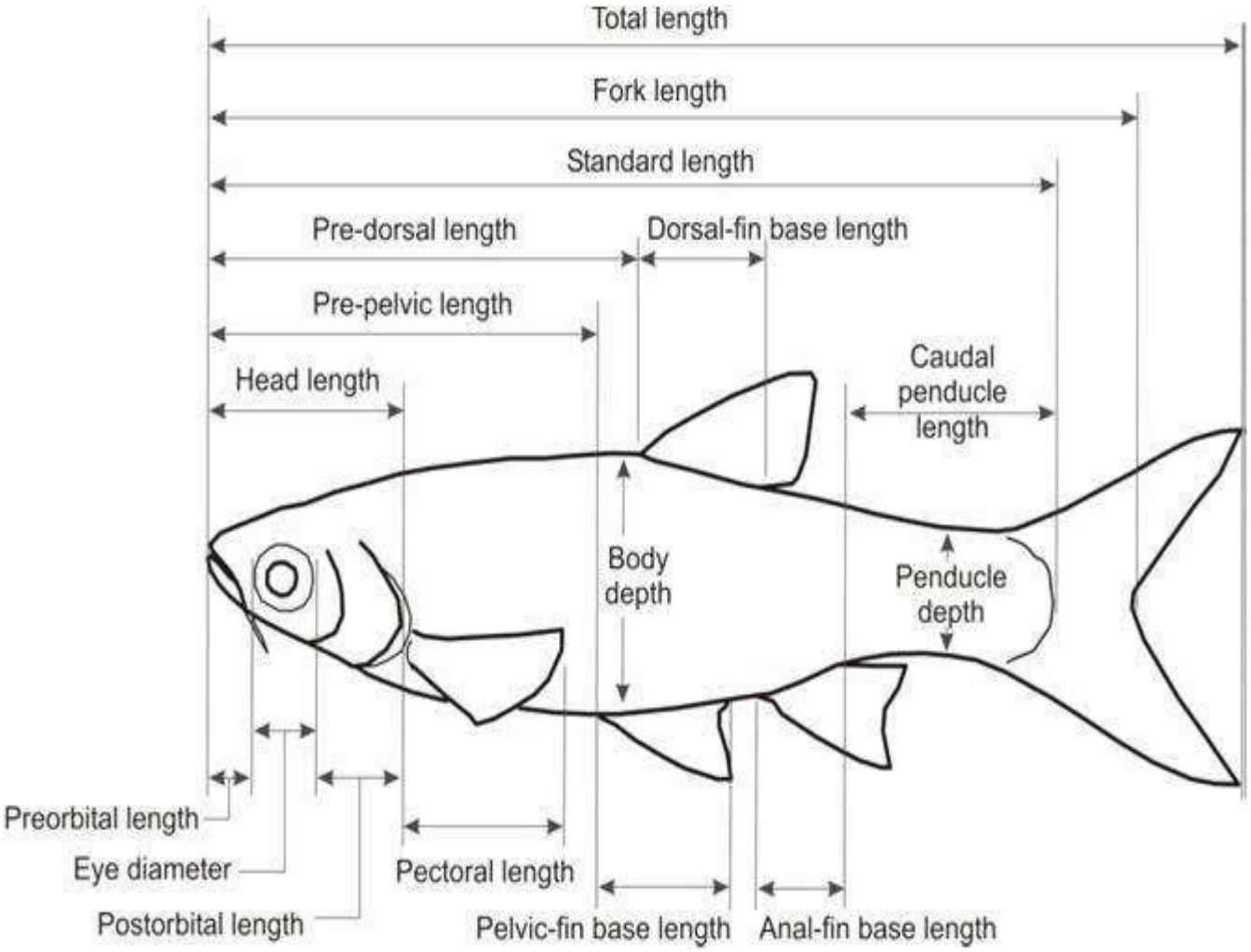
- D – Dorsal fin
- A – Anal fin
- P 1 – Pectoral fin
- P 2 or V 2 – Ventral fin
- C – Caudal fin
- L1 – Lateral line scales
- Ltr – Lateral transverse row of scales
- Ad– Adipose dorsal fin
- Gr – Gill rakers



- Dorsal fin count and anal fin count includes spines and rays. Among two dorsals one spinous and other ray type, then the formula may be given as D1 and DII where, DI stands for spinous first dorsal and DII stands for rays of second dorsal fin. If 3 spines and 7 branched rays are present in a single dorsal fin, then the formula may be given as DIII, 7.
- The anal fin count includes spines and rays. If two spines and 5 rays are present, the formula may be given as AII, 5.
- Pectoral fin count can be made on the left side. However, counts can be made on both sides in a few numbers of specimens to permit estimation of bilateral variations.
- Pelvic fin count includes both spines and rays if present.
- Fin count formula is given as below:
- D1, I, VII-VIII - This denotes first dorsal fin with one spine separated from the
- rest of spines (VII-VIII).
- D2, I, 15-16 - This denotes second dorsal fin with one spine followed by
- 15-16 rays.
- AII, I, 10-15 - This denotes anal fin with two spines separated from one spine
- followed by 10-15 rays.
- Gill raker counts are for lateral gill rakers on the first arch, normally on the left side. The raker at the junction of the upper and lower limbs (epibranchial and ceratobranchial) is included in the lower limb count as the major part of the base of the raker is over the

ceratobranchial. Rudimentary gill rakers, with the base width (lateral) of the raker equal to, or less than the raker length, occur at the anterior ends of the upper and lower limbs and these are included in the counts, though differentiated as ii, 7+19, iv=32.

- Lateral line scales (L1) are scales along the lateral line from its origin to its posterior most part of the lateral line. In some teleostean fishes as in clupeids lateral line is absent. In such case scales will be counted along the row where the lateral line normally would have been present.
- Predorsal scales are scales on the midline in front of the dorsal fin origin. These scales are counted as the scale rows which intersect the midline from the anterior point of the dorsal fin to the orbit.
- Scales above and below the lateral line (Ltr) – A transverse series below of scale rows; below the lateral line scales are counted from the origin of the anal fin, not including the median ventral scale row, along a forward diagonal to the lateral line; above lateral line scales are counted from the origin of the dorsal fin, not including the median dorsal scale row, on a diagonal backward to the lateral line; the lateral line row is not included in these counts.



1. *Catla catla*

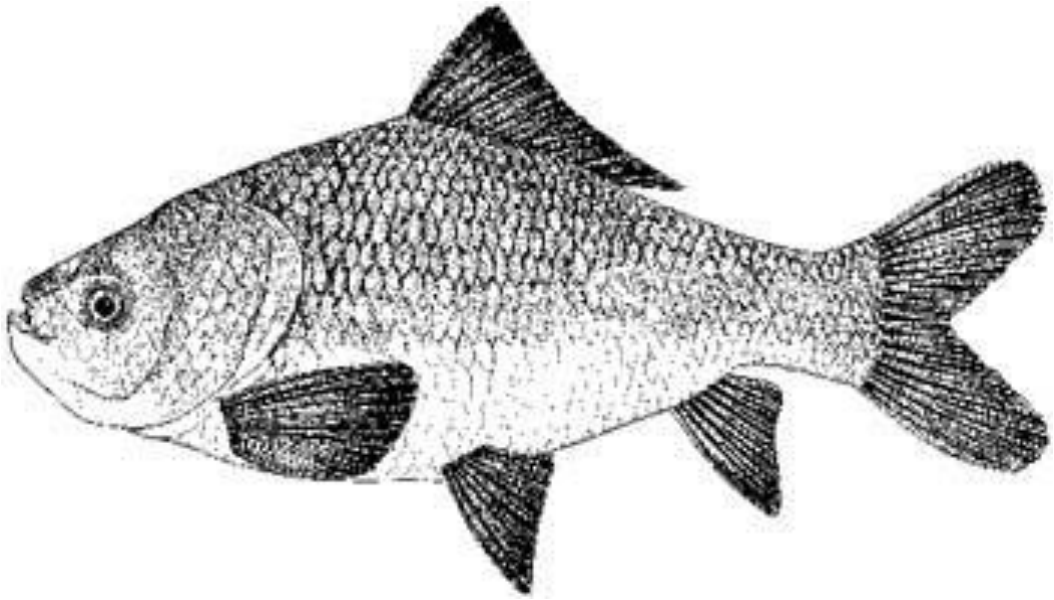
- Body: Short, deep, and laterally compressed, with a depth greater than the head length
- Head: Large and visible from below, with a depth that exceeds half of the head length
- Mouth: Wide and upturned, with a prominent lower jaw
- Upper lip: Absent
- Lower lip: Very thick
- Barbels: No
- Color: Grayish on the back and flanks, silvery-white below
- Scales: Large cycloid scales, except on the head and mouth
- Fins: Long pectoral fins that extend to the pelvic fins, a long dorsal fin without spines, and a short anal fin
- Caudal fin: Forked

Morphometric characters

- Wet body weight: 40 ± 48.3 g
- Total length: 5.04 ± 1.43 cm
- Condition factor: 39.5 ± 11.2
- Fork length: 4.57 ± 1.41 cm
- Standard length: 4.25 ± 1.43 cm
- Body girth: 2.97 ± 1.31 cm
- Eye diameter: 0.28 ± 0.07 cm

Meristic characters

- 17 dorsal soft rays
- 0 anal spines
- 7–8 anal soft rays
- Deep body, with depth 2.5 to 3 times in standard length
- Large, upturned mouth
- Prominent protruding lower jaw
- Long pectoral fins, extending to pelvic fins
- Conspicuously large scales



2. Labeo rohita

Scales

- The rohu has large, overlapping, round, bony, and flat cycloid scales that cover its body. The scales above the lateral line have tubes that are part of the lateral line system.

Fins

- The rohu has homocercal dorsal, anal, caudal, and ventral fins, as well as paired pectoral fins. The caudal fins are forked into two equal lobes.

Mouth

- The rohu has a small, inferior mouth with thick, fringed lips that have a distinct inner fold.

Snout

- The rohu has a depressed head with a short, blunt, and obtuse snout that projects beyond the mouth.

Eyes

- The rohu has paired eyes that are dorsolateral in position and are not visible from the outside of the head.

Barbels

- The rohu has two slender and filamentous barbels that arise from the upper lip. Barbells are sensory organs that help the fish find food.

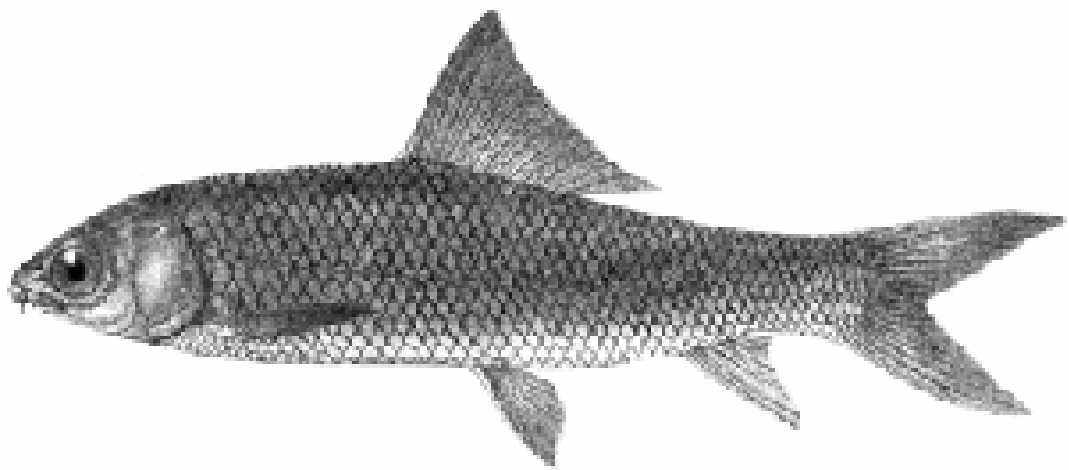
Body colour

- The rohu is bluish or brownish on its dorsal surface and silvery-white below. During breeding season, each scale has a red mark, and the fins become greyish or black.

Body bilaterally symmetrical, moderately elongate, its dorsal profile more arched than the ventral profile; body with cycloid scales, head without scale; snout fairly depressed, projecting beyond mouth, without lateral lobe; eyes dorsolateral in position, not visible from outside of head; mouth small and inferior; lips thick and fringed with a distinct inner fold to each lip, lobate or entire; a pair of small maxillary barbels concealed in lateral groove; no teeth on jaws; pharyngeal teeth in three rows; upper jaw not extending to front edge of eye; simple (unbranched) dorsal fin rays three or four, branched dorsal fin rays 12 to 14; dorsal fin inserted midway between snout tip and base of caudal fin; pectoral and pelvic fins laterally inserted; pectoral fin devoid of an osseous spine; caudal fin deeply forked; lower lip usually joined to isthmus by a narrow or broad bridge; pre-dorsal scale 12-16; lateral line distinct, complete and running along median line of the caudal peduncle; lateral line scales 40 to 44; lateral transverse scale-rows six or six and a half between lateral line and pelvic fin base; snout not truncate, without any lateral lobe; colour bluish on back, silvery on flanks and belly.

3. *Cirrhinus mrigala*

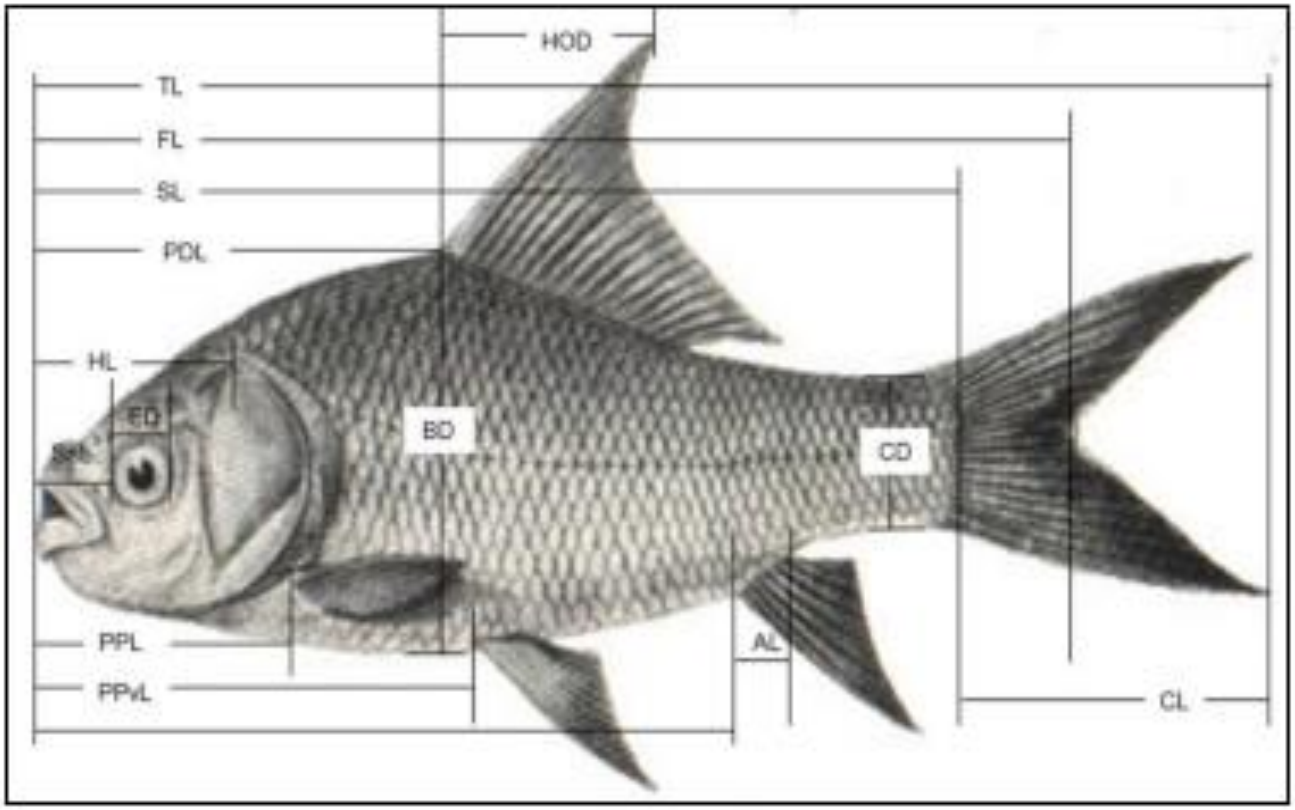
- **Body**: Oblong and moderately compressed, with a depth about equal to the length of the head
- **Head**: Large, with eyes located in the anterior half of the head
- **Mouth**: Wide and upturned, with a prominent lower jaw
- **Lips**: Upper lip absent, lower lip very thick
- **Barbels**: One pair of short rostral barbels
- **Scales**: Moderate size, with 40 to 45 lateral line scales
- **Color**: Silvery, dark gray along the back, sometimes coppery
- **Fins**: Pectoral, ventral, and anal fins tinged with black, caudal fin deeply forked



Body bilaterally symmetrical and streamlined, its depth about equal to length of head; body with cycloid scales, head without scales; snout blunt, often with pores; mouth broad, transverse; upper lip entire and not continuous with lower lip, lower lip most indistinct; single pair of short rostral barbels; pharyngeal teeth in three rows, 5.4.2/2.4.5 pattern; lower jaw with a small post-symphysial knob or tubercle; origin of dorsal fin nearer to end of snout than base of caudal; dorsal fin as high as body with 12 or 13 branched rays; last unbranched ray of dorsal fin non-osseous and non-serrated; pectoral fins shorter than head; caudal fin deeply forked; anal fin not extending to caudal fin; lateral line with 40-45 scales; lateral transverse scale rows 6-7/5½-6 between lateral line and pelvic fin base; usually dark grey above, silvery beneath; dorsal fin greyish; pectoral, pelvic and anal fins orange-tipped (especially during breeding season).

4. *Catla* morphometric parameters

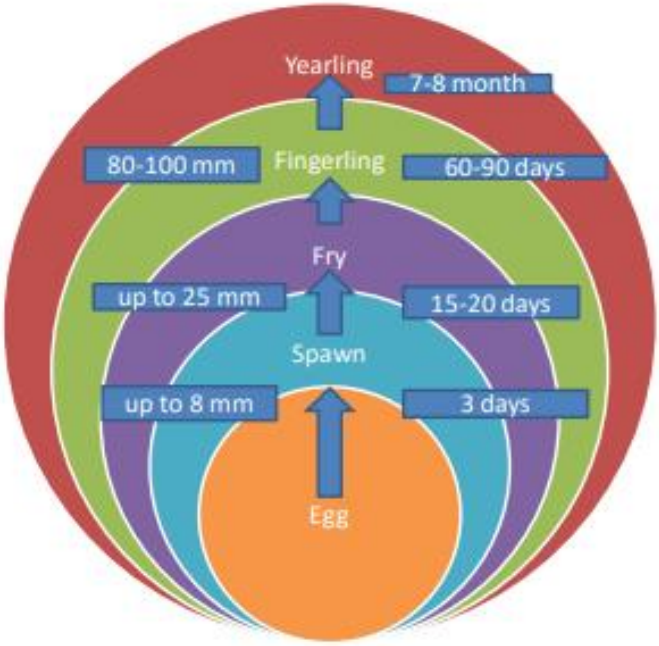
S.N.	Parameters	Code	Description of measured parameters
(i)	Total length	TL	It is a measurement of body length from tip of largest jaw (snout) to the largest part of caudal fin.
(ii)	Standard length	SL	Length from snout to the origin of caudal fin.
(iii)	Forked length	FL	Length from snout to the point of bifurcation of caudal fin.
(iv)	Head length	HL	Length from snout to the posterior most part of operculum.
(v)	Snout length	SnL	Length from snout to the anterior most margin of the eye orbit.
(vi)	Eye diameter	ED	Maximum length of eye orbit from one margin to other.
(vii)	Pre-dorsal length	PDL	Length from snout to the origin of the dorsal fin.
(viii)	Pre-pectoral length	PPL	Length from snout to the origin of pectoral fin.
(ix)	Pre-pelvic length	PPvL	Length from snout to the origin of pelvic fin.
(x)	Pre-anal length	PAL	Length from snout to the origin of anal fin.
(xi)	Height of dorsal fin	HOD	Height of dorsal fin from base of origin of dorsal fin to end of longest fin ray.
(xii)	Anal fin length	AL	Length from origin of 1st anal fin ray to the origin of the last anal fin ray.
(xiii)	Body depth	BD	Maximum vertical length of body (deepest part of the body).
(xiv)	Caudal depth	CD	Minimum vertical length of the body (minimum depth on caudal peduncle).
(xv)	Caudal length	CL	Total length – Standard length



5. Morphometric parameters of Catla, Rohu, Mrigal

Parameters		Catla	Rohu	Mrigal
		Min- Max	Min- Max	Min- Max
Total length	TL	33.000-69.500	38.000-72.000	37.300-64.000
Standard length	SL	26.000-55.600	30.000-57.400	29.200-51.000
Fork length	FL	27.000-61.200	20.000-64.900	31.000-58.100
Head length	HL	8.000-18.700	7.400-19.200	6.100-13.900
Snout length	SnL	3.200-13.400	3.200-9.200	2.200-9.300
Eye diameter	ED	1.200-2.400	1.100-2.700	1.200-2.300
Pre dorsal fin length	PDL	13.400-28.400	14.000-30.500	13.600-26.700
Pre pectoral fin length	PPL	7.400-16.600	7.100-22.700	6.700-14.400
Pre pelvic fin length	PPvL	13.200-32.000	16.000-34.600	15.200-28.900
Pre anal fin length	PAL	21.400-47.500	24.000-47.000	23.800-43.200
Height of dorsal fin	HOD	5.500-12.700	6.000-15.100	6.600-13.100
Anal fin length	AL	2.000-5.400	2.100-8.800	2.100-6.300
Body depth	BD	7.400-28.000	9.300-26.100	7.500-18.800
Caudal depth	CD	3.600-9.900	3.100-10.700	3.600-10.400
Caudal length	CL	6.900-16.900	6.900-14.600	8.000-13.000
Body weight	WT	700.00-5700.00	500.00-4500.00	600.00-3100.00

6. Identification of fish fry and fingerlings



Fish Eggs

Fish Spawn

Fish Fry

Fish Fingerlings

Characteristics	Catla	Mrigal	Rohu
Body shape	Wider body depth	Slender body	Moderate
Mouth	• Upturned mouth • Circular mouth gap/ opening • Lower lip folded but not fringed • Lower lip and upper lip terminates at the same point	• Mouth inferior • D-shaped / rectangle mouth gap • Lower lip neither folded nor fringed • Extending upper lip which covers the lower lip	• Terminal mouth • Square mouth gap • Lower lip fringed and folded • Extending upper lip which covers the lower lip
Eye	A red spot on lower part of eye ball	No such red spot	No such red spot
Fin colour	All fins are darkish in colour	Pectoral, pelvic and anal fins are orange in colour	Pelvic fins are red in colour and other fins are darkish in colour
Lateral line	Curved	Clearly visible and almost straight	Slightly curved
Head size/ shape	Larger head	Isosceles head	Equilateral head
Scale size/shape	Larger scale	Exposed portion of scale is rectangular shaped	Exposed portion of scale is diamond shaped
Body colour	Dorsal side blackish in colour while ventral region silvery	Silvery	Slight golden appearance with darker dorsal side

7. Fresh water prawn

Macrobrachium rosenbergii

The Giant freshwater prawn, *Macrobrachium rosenbergii* (De Man, 1879), commonly known as Scampi, is one of the most important freshwater prawn species widely cultured in several tropical and sub-tropical countries around the world. It has several attractive attributes as a candidate species viz., fast growth rate, compatibility to grow under poly-/mixed-culture, hardy nature, high market price and demand in both domestic and export markets. Besides, it can also be cultured in low saline brackish water areas (salinity < 10 ppt). It is an indigenous species of India and is naturally occurring in most of the river systems along both coasts of India. It can be cultured alone or with compatible fish species such as Catla (*Catla catla*) and Rohu (*Labeo rohita*). It is also a suitable species for incorporating in paddy-cum-fish culture (rice-prawn farming) system. Culture of Scampi can be carried out in earthen ponds, cement tanks and pens.

8. Freshwater craft:

A. Dingi

The crafts are plank built, made up locally using Shisham wood. The size of boat varies from 42 – 45 cm in length and 8 - 10 cm in width. The boat preservatives ie. painting with bitumen, act as water-resistant and protect crafts from decay and destruction. It also gives long life to the craft besides making the boat leak proof. Every six months the craft is completely painted by the dammar. The manufacturing cost of the boat is estimated around Rs. 8000-10000 with a life span of 8-10 years.

B. Coracle

Coracles are light in weight, bowl shaped boats with a frame of woven grass, reeds, or saplings covered with hides. Over the years, these circular crafts were constructed by interwoven strips of bamboo and covered with water proof materials such as plastic bags coated with a layer of coal tar. The boat size ranges between 1.50 - 2.00 meters dia. The coracle weight ranges between 10 - 15kg. A single oar is used to propel the coracle. Two fishers conduct the fishing in a coracle. Gillnet and long line are the common fishing methods. Apart from being simple and inexpensive, these are durable (2 – 3 years) and have good movability in all water bodies. It is profoundly used in Tamil Nadu, Andhra Pradesh, and Karnataka.

C. Dhoni

It is a long dug-out canoe made from carved out basal part of the trunk of a palmyra tree. It is around 3 - 4m length and with an internal diameter of 0.5m. The major portion of the trunk is longitudinally scooped out for sitting and keep the captured fish. Wooden bar is sometimes fixed in the mid region of the scooped-out part for sitting and to avoid collapse of the canoe. Margins of the scooped-out part is framed by circular iron frames in some canoes to prevent from splitting. It is operated by a single person due to its small size. The narrow width of this gear also facilitates rolling movements, and hence skilled individuals operate these canoes to maneuver it effectively.

D.Plank built boats

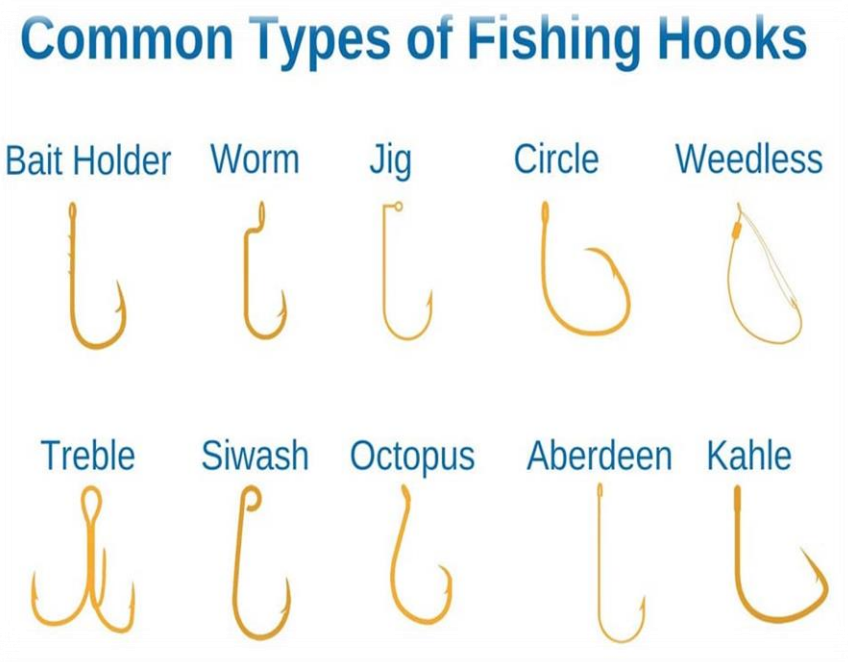
These are spindle shaped and constructed by joining quality wooden planks with iron nails. Joints are leak proofed by applying coal tar. Small and large sized plank built rowing boats are commonly used in the lakes. The smaller boats are 5 - 6m long with 80 - 90cm beam width and used for transport of harvested fish and also passengers from village to village within the lake. They are non-mechanized and manually operated. Bigger boats are about 15 - 20m long and are mechanized. They are used to transport fish to landing centers.

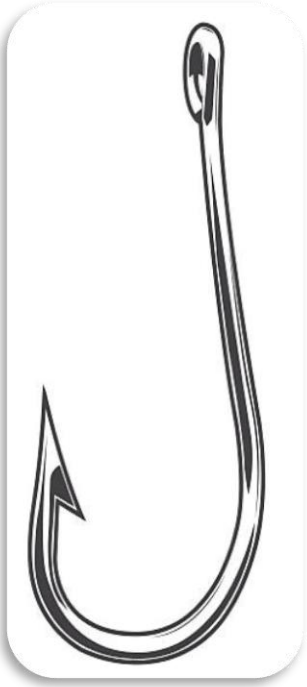
E. Thermocol raft

It is an improvised country made fishing craft made of used thermocol boxes and slices (for fish preservation and transport). The required number of thermocol boxes and slices is tied together with the help of nylon ropes to make a platform of length 4 - 5m length with 1m width. It is commonly operated by children of 10 - 15 years of age for setting and collection of traps, transport of catch and fish capture near the lake shore.

9. Freshwater Fishing gear

A. Hooks





It is one of the oldest and widely used fishing methods which are not commercially used and fish caught is consumed by fishermen family itself. Catching of fish in which fishes are caught individually is based on feeding and hunting behaviour of fish species. In this technique, fish are caught with the help of baits tied to a metal hook tied with one end of a strong nylon thread and the other end of nylon thread is tied to a bamboo pole of different lengths to dip the metal hook supplied with bait in the water. Earthworms, Grasshoppers, small sized fish and trash fish pieces are commonly used as baits. Attracted to the bait, fish swallow and gets entrapped by the hooks are caught by pulling up the threads. Catfishes and murrel are caught with this technique.

B. Box Traps

It is a fishing device in which fish are enticed by enclosures where they are guided to enter the trap. It is the chief gear used for fishing in the lake to catch different species and sizes of fish. These are made of split bamboo sticks woven with the long pliable stems of a creeper called Good apala Theega. Catching fish through traps is a passive process. Baits are kept inside the traps sometimes to attract fish. The rectangular shape basket trap is the most extensively operated gear and accounts for major part of the catches. It has two vertical openings, one on each long side. Each vertical opening is fixed with a series of inwardly directed, short, pointed bamboo sticks interwoven in such a way that the tips of the two series of splints cross each other. This type of arrangement only permits easy entry of the fish but not their exit. Three types of basket traps are regularly used in this area.

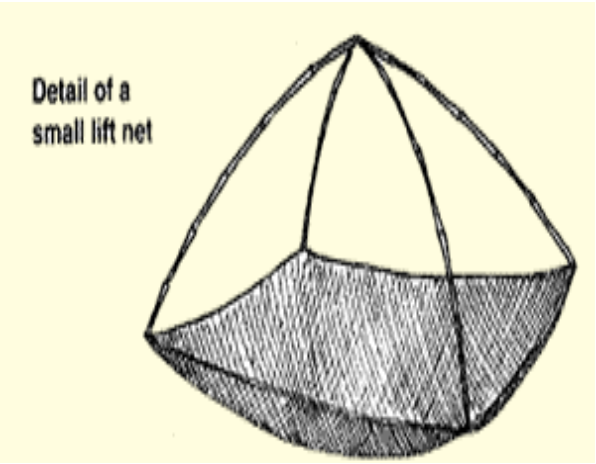
C.Tubular trap

It is funnel like (Gampa) seasonal (October to January) trap made of split bamboo slivers used to catch small and medium size fish. It is about 1 - 2m long with a wide mouth (85cm diameter) at one end and with a narrow opening at another end. The narrow end is attached to a large basket (Gari), narrow and longer than gampa and provided with a valve-like arrangement which allows entry of fish but not exit.

D. Bag Net

It is a bag like net with framed mouth. It is more or less circular made up of nylon with a mesh size of 2 - 3 mm and depth of a bag is about 0.5 - 1m provided with a circular iron frame and a long handle made with a bamboo pole. This net can be horizontally extended when scooping it through the water column. Fishes entering the bag net are caught due to water filtering. Net is operated in shallow water regions of the lake either from the banks or the dugout canoes by inserting the net inside water below the aquatic weeds or in the weed infested area. This net is also used as a passive gear while fish catching through 'gaya' method. This net can also be used to collect mollusks (Duck feed & fish bait) by dragging or scooping over the bottom of the lake bed.

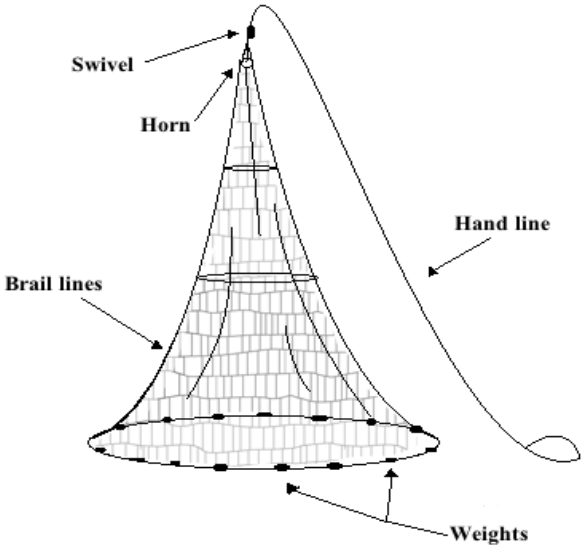
E. Hand lift net:



It is a small, portable hand operated net used in the shallow region of the river to catch small sized fish. It is a rectangular shape dip lift net supported by an X-shaped bamboo frame. A frame is made of two flexible bamboo poles of equal lengths. Four corners of the net are tied into four corners of the bamboo frame. This mobile scooping gear is dipped in shallow waters for some time and then lifted up rapidly from water to catch the entrapped fish which happen to be over the net by hand picking.

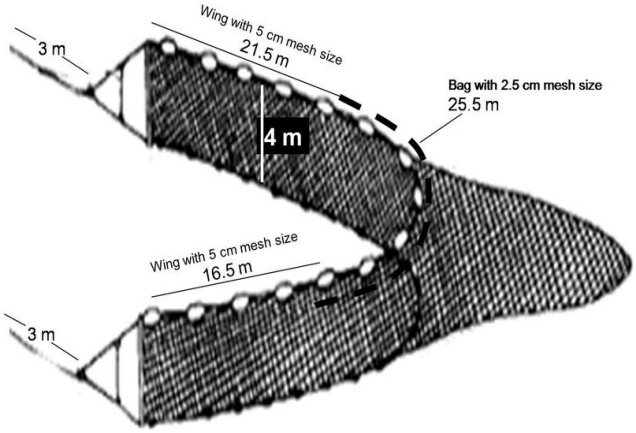
F. Cast net

The cast net is operated in shallow waters of the lake where depth is about 2 - 3m. It is circular net having umbrella shape made of nylon fibers. The cast net is a falling gear and operation of cast net is an active fish catching process. Iron or lead sinkers are fixed along the margin, and a strong rope of 5 - 6m is attached to the apex of the net to haul the net during its operation. Size of the mesh ranges from 20 - 45mm and perimeter range from 10 - 18m based the size of the fishes to be caught. These nets can be operated single handedly in which fishermen throw the net conveniently and skillfully over the water either from a boat or the banks of the lake in such a way that it spreads on the water surface fully expanded at its perimeter and cord is held in hand at its apex. Net sinks to the bottom of the lake with closed circumference due to the weight provided by sinkers provided. Small fishes such as carps and catfishes caught with these nets then pulled with the help of the cord



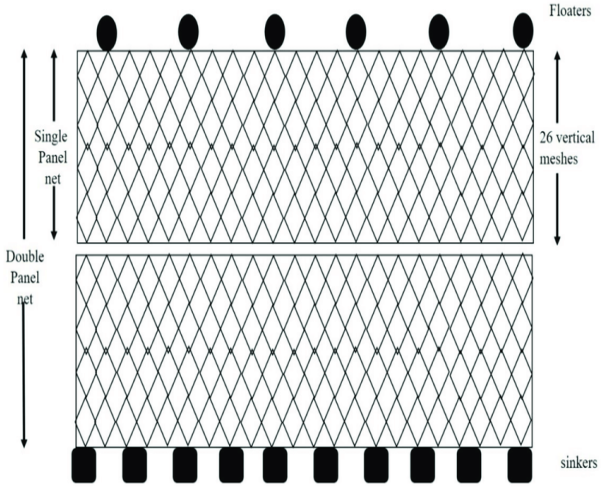
G. Drag net

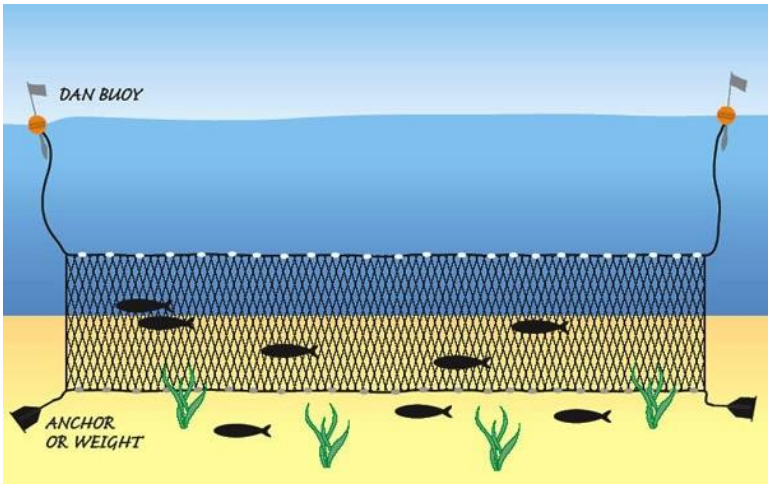
Drag net is used to encircle certain region of the lake to catch a detected fish school by dragging the net or scooping it out with other gears. It is very effective gear to catch the wild fish population and is more suitable for huge water bodies such lake Kolleru. During its operation, one end is fixed at the bank of the lake, and the other end is to be towed in an arc around the fish shoal to surround them, and a boat or Dhoni is used to pull the net into a large area before its hauling to the bank of the lake.



H. Gillnet

Gill net is a passive rectangular gear. This net is erected in water column vertically perpendicular to the movement of fish with the help of head and foot ropes provided with sinkers and floats respectively. As fish attempt to swim through the mesh of the net, they become snagged by their gill operculum, fins or by their scales. Small undersized fish usually can swim through the mesh unharmed, whereas excessively large fish are unable to penetrate the mesh sufficiently to become trapped. Characteristics such as simplicity in its operation, design, and construction, low investments attract the fishermen to use it extensively. Nets of smaller size are operated in the shallow regions of the lake depth ranging from 1 - 2m where as large sized ones are relatively used in the deeper areas of the lake at 2 to 4m depth.





Raja Rammohun Roy National Agency for ISBN

Department of Higher Education, Ministry of Education

Government of India

Welcome: Dr. N. SREENIVAS (Self Published Author)

Book Details

Back

Book Title	CAPTURE FISHERIES (AQUACULTURE MAJOR-COURSE-6 LAB MANUAL)
ISBN Number	978-93-341-5755-0
Name of Publisher	Dr. N. SREENIVAS
Language	English
Country of Publication	INDIA
Product Composition	Single-component retail product
Product Form	E-book reader
Date of Publication[DDMMYYYY]	02/11/2024
Edition	
Type of Author/Editor	Author

Author/Editor	Dr. N. SREENIVAS
Co-author/Co-Editor	Dr. I S CHAKRAPANI, Dr. P. ANIL KUMAR

III SEMESTER

CAPTURE FISHERIES

(AQUACULTURE MAJOR-COURSE-6 LAB MANUAL)



Dr.SREENIVAS - Dr.CHAKARPANI - Dr.ANIL KUMAR

Lecturer in Zoology
Government Degree College
RAMACHANDRAPURAM-533 255
Dr. B R Ambedkar Konaseema Dist.

Lecturer in Zoology
PRR & VS Government Degree College
VIDAVALURU- 524 218
SPS Nellore Dist.

Professor in Zoology & Principal
SCIM Government Degree College
(Autonomous)
TANUKU -534 211
West Godavari Dist.

ISBN 978-93-341-5755-0