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## **A STUDY ON THE ICHTHYOFAUNAL DIVERSITY OF WETLANDS IN AND AROUND KOLKATA**

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### **INTRODUCTION**

Wetlands support a good diversity of freshwater and brackish water fish throughout the country. Wetlands like marshes, rice-fields, grass and sedge covered shallow aquatic habitats are generally temporary, drying up during the hot summer months, either fully or at least partially. Lakes, ponds, reservoirs etc. are deep and rarely dry up completely. All are variable in depth, nature of substrate (largely, very muddy), seasonality and often with dense growth of emergent (like rice-fields), submerged and floating vegetation. As the large rivers are influenced by tides, it is very difficult to draw a distinctive line between freshwater and brackish water and some marine and estuarine fishes move inland into freshwaters. The present work embodies results of a study that reveals 46 species of major freshwater and estuarine fishes of the wetlands of Kolkata and its surroundings.

### **STUDY AREA AND NATURE OF WETLANDS**

Among a number of wetlands present in and around Kolkata, only 3 (three) have been selected as study area. These are (i) freshwater wetland of Bartibill near Barrackpore – this is a freshwater marshy land connected with Ganges by canal and used for agricultural purpose and here aquatic flora is very rich and diverse; (ii) sewage-fed wetland in Bantala of Eastern Kolkata – it is sewage fed wetland, connected with sewage canal and storm water canal; sewage-fed fishery is done here and (iii) semi-estuarine wetland of Kharibaria and Gopalpur near Basirhat – these are vast plain fishing bheries connected with branches of Bidyadhari through canals, used for fishery, aquatic flora are very few.

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\**Zoological Survey of India, Kolkata*

## HABITS AND HABITATS

In both deep and stagnant and slow moving wetlands we find surface dweller, mid water swimmer and bottom dweller fish. Smaller fish tend to occupy the shallow peripheral areas. Surface-swimming small fishes in fresh and brackish water wetlands are mostly rice fish, guppies and other mosquito fish. Danios and flying barb swim more erratically, breaking the surface for feeding. Surface dwellers have a flat dorsal profile that is on level with the surface of water. Carps, barbs and many other fishes having a laterally compressed muscular body with high dorsal fin and a deeply forked tail are capable of swift movement and inhabit mid-waters. A number of species of *Puntius* and *Labeo* are midwater-swimming and bottom feeder. Bottom dwellers, have a flattened ventral profile and an arched dorsal profile. Some catfishes, loaches and *Garra* are good examples of bottom dwellers. Loaches and *Garra* typically attach themselves to rocks or submerged objects. The bottom-dwelling catfishes and snakeheads tend to hide within cavities and crevices.

Fishes that swim in the midwaters and along the surface usually stay in groups. Bottom-dwellers are more territorial and tend to be solitary. Similarly, those species that prefer to occupy caves and crevices are also solitary, predators and rare.

According to the trophic niche occupied by the fish in a water body fishes are grouped into (i) surface feeder (ii) column or mid feeder and (iii) bottom feeder. According to the character of diet they thrive on, adult fishes have been classified into herbivorous, carnivorous and omnivorous. Some put plankton and detritus feeding fish into a separate class. The feeding behaviour is species characteristic.

Normally fishes lay eggs unprotected in water. The males fertilize these eggs by spraying sperms over them, as the breeding pair swims together. Mouth-breeding cichlids keep brood eggs in their mouth and several other fishes, like stickleback and gouramies, build nests for laying and protecting their eggs either at bottom or floating on the surface. Some fishes are ovo-viviparous or 'live-bearers' Most of the Cypriniform fishes predominate freshwater and breed during monsoon, while the estuarine fishes viz. Mugilidae breed in winter.

The enemies of fishes are the mink, otter and cats among the mammals; the kingfisher, herons, ducks and terns among birds; and occasional bull frog; several snakes and many fishes, spawn eaters, fry catchers and adult eating, predacious fishes.

Fishing for sport is a more recent development when compared to hunting and trapping. The common Indian fishes considered as game fish include some of the carps, larger catfish and mahseer. A species that fights is often a favourite fish as it provides the angler with a challenge and tests his endurance and skill.

Some of the important works on the faunal composition in the wetland areas were done mainly by Yazdani and Singh (1990, 2002), and Nandi *et. al.* (1993, 1999), and Alfred and Nandi (2001). But works on ichthyofaunal composition of the area under study are very scanty. Identification of fishes have been done based on Yazdani (1986) Jayaram (1999), Talwar and Jhingran (1994), and Daniels (2002).

## SYSTEMATIC ACCOUNTS

### Family NOTOPTERIDAE

The feather backs are moderately large fishes, elongate with the body broad, strongly compressed laterally with thin scales on head also. Abdomen serrated before the pelvic fins.

#### 1. *Notopterus notopterus* (Pallas) – **Pholui**

*Size* : Grows to 60 cm.

*Habitat* : Freshwaters : tanks, beels, lakes, ponds, tributaries.

*Behaviour* : Found throughout the water body and carnivorous in habit.

*Breeding* : Breeds both in stagnant and running water in rainy season. Ripe females bear a small number of eggs which are laid in clumps on submerged vegetation.

*Diagnostic characters* : Silvery sides with bluish-grey back, golden yellow tinge on head, greyish spots all over the body.

### Family CYPRINIDAE

It is the largest single family of freshwater fishes. Among 45 species dealt here, 18 species belong to Cyprinidae. All species belonging to this large family are popularly called barb, carps, danios, rasboras and minnows. These are laterally compressed with forked tail and well-developed scales.

#### 2. *Catla catla* (Ham.) – **Katla/Katol**

*Size* : Large fish grows to a maximum length 150 to 200 cm. and a weight of 70 kg.

*Habitat* : Freshwaters : tanks, lakes, ponds.

*Behaviour* : Major Carp. Adults are non-predatory, herbivores and feeding is restricted to the surface and mid-waters. The juveniles feed on insects in addition to detritus and algae.

*Breeding* : Breeds in rivers during the south-west monsoon. Adults reach sexual maturity at the age of 2 years.

*Diagnostic characters* : This is a large fish with a massive head, thick lips and very large scales. It has a silvery body with dark grey above and whitish on the belly or dull greyish. L.l. 38-43.

### 3. *Cirrhinus mrigala* (Ham.) – Mrigal/Mrigel

*Size* : Large fish attaining a maximum length of 100 cm.

*Habitat* : Freshwaters : rivers, tanks, ponds.

*Behaviour* : Major Carp. Adults are popular game fish, bottom dweller, entirely herbivorous and also detritus eater. The juveniles are omnivorous until they are about 5 cm.

*Breeding* : Breeding usually takes place during the south-west monsoon in the shallow margins of rivers and bundhs.

*Diagnostic characters* : It has a downward facing mouth with the upper lip being prominent. It is dark grey with coppery tinge along the back with big and bright golden scales on the sides and silvery white on the belly, fins orange stained with black. L.l. 40-45.

### 4. *Cirrhinus reba* (Ham.) – Kharkebata

*Size* : Small carp, growing up to a maximum length of 30 cm.

*Habitat* : Freshwaters : rivers, tanks, beels, ponds.

*Behaviour* : Bottom feeder, largely herbivorous and feeding on detritus.

*Breeding* : Breeding occurs in flood waters during the months of June-September. This species is very fast growing.

*Diagnostic characters* : Distinguished by the large hexagonal scales and a very short pair of barbels. It is silvery, scales with dark edges forming longitudinal bands above lateral line. L.l. 35-38.

### 5. *Labeo bata* (Ham.) – Bhangon bata/bata

*Size* : Grows to 60 cm.

*Habitat* : Freshwaters : big rivers, tanks, lakes, ponds, beels.

*Behaviour* : Minor carp, column or mid-feeder, feeding on submerged aquatic plants.

*Breeding* : Breeds during monsoon months in rivers.

*Diagnostic characters* : Colour varies with age, generally silvery, darkest along the back, lower fins stained with orange, fine black dots on all the fins. L.l. 37-40.

### 6. *Labeo rohita* (Ham.) – Rui

*Size* : Large barb/carp and grows to a maximum size of 100 cm. and weight more than 50 kg.

*Habitat* : Freshwaters : big rivers, tanks, lakes, ponds, beels.

*Behaviour* : Major Indian carp, a good game fish, column or mid-feeder, doing best in flowing waters and feeding on submerged aquatic plants.

*Breeding* : Breeds during the south-west monsoon. It spawns in flooded rivers at depth between 50 to 60 cm. laying as many as 2 to 3 lakhs eggs.

*Diagnostic characters* : An arched back and large eyes are the main characteristics. It is generally brownish blue or reddish blue along the back with silvery sides and below, scales with dark borders with red or orange centre inside. L.l. 40-42.

### 7. *Labeo calbasu* (Ham.) – Kalbasu/Kalbose/Kalibaush

*Size* : Large barb/carp and grows to a maximum size of 90 cm.

*Habitat* : Freshwaters : rivers and ponds and also found in brackish water.

*Behaviour* : Major Carp. It is a popular game fish, bottom dweller, omnivorous and detritus feeder.

*Breeding* : Breeding occurs in the flowing water.

*Diagnostic characters* : The mouth is downwards facing and has two pairs of barbels. It is blackish or metallic grey all over the body, slightly lighter below, fins black, upper caudal lobe sometimes edged white. L.l. 40-44.

### 8. *Amblypharyngodon mola* (Ham.) – Mourala/Morola

*Size* : Grows to 7-8 cm.

*Habitat* : Freshwaters : rivers, ponds, beels, lakes, paddy fields, ditches.

*Behaviour* : Column feeder and feeds on submerged vegetation.

*Breeding* : Breeds both in stagnant and running water in rainy season.

*Diagnostic characters* : Silvery body with a deep greyish longitudinal band in the middle of the body; dorsal, caudal and the whole of the body covered with minute black dots. L.l. 65-75.

### 9. *Salmostoma bacaila* (Ham.) – Chela

*Size* : Grows to 18 cm.

*Habitat* : Freshwaters : tanks, beels, rivers, ponds lakes, tributaries.

*Behaviour* : Surface dweller and useful larvivorous species.

*Breeding* : Breeds during monsoon in rivers.

*Diagnostic characters* : Uniformly silvery. L.l. 86 to 110.

#### 10. *Cyprinus carpio* (L.) – American Rui/Common Carp

*Size* : Grows to 45 to 60 cm. in length.

*Habitat* : Freshwaters : tanks and ponds mostly reared one. It prefers water with mud or silt substrate.

*Behaviour* : A popular game fish, bottom dweller, and prefers to stay in large groups. It is quite adaptive. It is omnivorous and also known to dig and burrow into the pond embankments in search of organic matter. It gulps in mud and rejects indigestible matter, making the pond water turbid.

*Breeding* : The females lay about a million eggs in water where there is an abundance of floating aquatic plants. The eggs attach themselves to the plant.

*Diagnostic characters* : A stout bodied carp with small mouth and thick lip. It has golden yellow sides with dark back and white belly and dark and pink tinged fins. L.l. 30-40.

#### 11. *Osteobrama cotio* (Ham.) – Mouwa/Chanda

*Size* : Grows to 15 cm.

*Habitat* : Freshwaters : rivers, beels, tanks, bheries, ponds.

*Behaviour* : Surface or column feeder, possibly a useful larvicide.

*Breeding* : Breeds in rivers in monsoon.

*Diagnostic characters* : Silvery black on the back, sometimes with a silvery lateral band, sometimes a black blotch before the base of the dorsal fin and another on the nape. L.l. 55-70.

#### 12. *Rasbora daniconius* (Ham.) – Dankoni/Dhera/Dadhika/Darkina

*Size* : Grows up to a length of 10 cm.

*Habitat* : Freshwaters : tanks, beels, rivers, ponds.

*Behaviour* : The Blackline Rasbora is generally a slow moving fish, swimming or propelling itself by jerking its body. The young fish tends to move in group.

*Breeding* : Usually breeds before the rains. The young are dispersed during rains.

*Diagnostic characters* : Small, slender and elongated fish. It has a greenish yellow back with silvery sides, a bluish lateral stripe edged with golden yellow, fins pale orange, caudal lobes tinged with black. L.l. 30-34.

### 13. *Danio devario* (Ham.) – **Baspata**

*Size* : Grows to 10 cm.

*Habitat* : Freshwaters : rivers, ponds, tanks, ditches.

*Behaviour* : Very active shoaling fish, swimming close to the surface, it swims gracefully by gently bending the body in a serpent-like movement. It is quite expert in swimming against the current in swift flowing water.

*Breeding* : Breeds both in stagnant and flowing water in monsoon.

*Diagnostic characters* : Greenish above and silvery at sides, three horizontal bluish lines divided by yellow bands extending backwards to caudal. L.l. 41-48.

### 14. *Esomus danricus* (Ham.) – **Dadhikha, Danrika**

*Size* : Grows to maximum 12.5 cm. but the usual size is less than 10 cm.

*Habitat* : Freshwater : ponds, tanks, ditches and canals.

*Behaviour* : Flying barb is active fish that swim and feed close to the surface. They prefer well aerated water. The species is capable of leaping high and far out of the water.

*Breeding* : Breeding takes place during October-December.

*Diagnostic characters* : This slender fish is identified by its gold and black lateral band, its long maxillary barbels and pectoral fin wing-like, fins orange red. L.l. 27-30.

### 15. *Puntius sophore* (Ham.) – **Puthi/Puti**

*Size* : Attains the maximum length of 13 cm. although the normal size is 5-6 cm.

*Habitat* : Freshwaters : tanks, beels, paddy fields, tributaries.

*Behaviour* : Adults usually move in large groups. They often spread over long distances during the rains, specially during floods.

*Breeding* : Breeds during the monsoon.

*Diagnostic characters* : Small barb with a moderately deep body and clear fins. It is silvery, often with a black diffused spot at the caudal fin base, a scarlet lateral band and a dark spot at the base of dorsal fin, an orange golden spot below the eye, and tips of fins reddish or orange tinged. L.l. 23-26.

**16. *Puntius conchoni* (Ham.) – Kanchan puti**

*Size* : Attains the maximum length of 14 cm. although the normal size is 5 to 6 cm.

*Habitat* : Freshwaters : ditches, tanks, beels, ponds, in small irrigation canals also.

*Behaviour* : Generally they are lively creatures moving about in groups. When they are feeding on submerged plants at the bottom of turbid waters, a number of eye spots are an obvious sign of the Rosy Barb's presence. The newly hatched fry feed on plankton and grow rapidly.

*Breeding* : Breeds in shallow water with luxuriant vegetation and breeding adults are seen during the months of April-May.

*Diagnostic characters* : Greenish grey on the back becoming silvery towards the sides, a large round black blotch on the middle of the caudal peduncle (on 19th-20th scales) orange coloured fins, dorsal fin tip tinged with black. L.I. 24-26.

**17. *Puntius sarana* (Ham.) – Saral puthi/Swarna puthi**

*Size* : Attains a maximum length of 25 cm.

*Habitat* : Freshwaters : tanks, beels, ponds, tributaries, lakes.

*Behaviour* : Adults usually move in large groups. They feed on submerged vegetation.

*Breeding* : Breeds during the monsoon in running water among the submerged boulder and vegetation.

*Diagnostic characters* : Medium size fish with a deep body. It is dark grey above and silvery below, sometimes horizontal bands along the rows of scales in the upper half of the body, often a golden blotch on the opercle, fins greyish white. L.I. 32-34.

**18. *Puntius ticto* (Ham.) – Tita-puthi**

*Size* : Attains a maximum length of 10 cm.

*Habitat* : Freshwaters : ditches, tanks, beels, ponds. It dwells along the margins of the still and shallow water.

*Behaviour* : A very active fish moving with other barbs in shallow water. It is rather peaceful in temperament. The fry feeds mainly on zooplankton.

*Breeding* : Usually breeds at a water temperature of 24-26 °C. About 150 eggs are laid in batches.

*Diagnostic characters* : Small brightly patterned silvery fish with two black lateral spots during seasonal changes (March to September), often develops bright red colour on the flanks and olive green on the back. L.I. 22-26.

## Family BAGRIDAE

Popularly known as catfish possess an elongated body without scales. The mouth is wide and the nostrils are far apart.

19. *Sperata seenghala* (Sykes) – Arr-tengra

*Size* : Attains a maximum length of 150 cm. although the normal size is 40 cm.

*Habitat* : Freshwaters : rivers, beels, canals, flooded fields and ponds.

*Behaviour* : This is a predatory species feeding on other fishes. It is a good sport fish and graceful swimmer.

*Breeding* : Normally breeds before the onset of monsoon. It builds circular nests in the month of March.

*Diagnostic characters* : Large river cat fish with wide mouth. A round black spot on the posterior end of adipose fin, brownish along back, silvery on sides and below.

20. *Mystus vittatus* (Bloch) – Tengra

*Size* : Attains a maximum length of 21 cm.

*Habitat* : Freshwaters : tanks, beels, canals, flooded fields and ponds. It is usually found among marginal vegetation with muddy substrate and rarely in rivers.

*Behaviour* : Generally solitary, moving about along the bottom. The colour of the fish varies with the nature of the water and age of the fish. They are not very aggressive. It feeds on aquatic insects and other invertebrates.

*Breeding* : Breed during the rains in August-September. The young disperse with the rainwater.

*Diagnostic characters* : Small silvery fish with prominent golden tinge, 5 narrow black bands on the body above and below the lateral line, a black shoulder spot usually present, fins edged with dark black.

21. *Mystus tengara* (Ham.) – Tengra

*Size* : Attains a maximum length of 18 cm.

*Habitat* : Freshwaters : tanks, beels, ponds, paddy fields.

*Behaviour* : Generally solitary, moving about along the bottom. The colour of the fish varies with the nature of the water and age of the fish. They are not very aggressive. It feeds on aquatic insects and other invertebrates.

*Breeding* : Breed during the rains in August-September. The young disperse with the rainwater.

*Diagnostic characters* : Brilliant yellow with dark shoulder spot and about 5 black longitudinal bands.

## Family SILURIDAE

Popularly known as sheat fish, includes species that are generally elongated and laterally flattened with a highly reduced dorsal fin.

22. *Ompok bimaculatus* (Bloch) – Pabda

*Size* : Grows to 45 cm.

*Habitat* : Freshwaters : rivers, beels, kharies.

*Behaviour* : Occurs in shallow, often muddy water and also in sandy rivers and tanks. It is generally solitary, moving about close the bottom in a serpentine motion. It is a voracious feeder. It hides among rocks and debris and the overall brownish colouration camouflaging the catfish and making it like a dead fish.

*Breeding* : Breeds during the monsoon.

*Diagnostic characters* : Medium sized, laterally flattened catfish with a wide mouth. Silvery shot with purple, a black spot on the shoulder behind the gill opening, dorsal side greenish dark with a wash of golden yellow when alive, a small triangular black spot just above the lateral line on caudal peduncle.

23. *Ompok pabo* (Ham.) – Pabda/Pabo

*Size* : Grows to 24 cm.

*Habitat* : Freshwaters : rivers, beels, kharies.

*Behaviour* : Generally solitary, moving about close to the bottom in a serpentine motion. It is a voracious feeder. It hides among rocks and debris and the overall brownish colouration camouflaging the catfish and making it like a dead fish.

*Breeding* : Breeds during the monsoon.

*Diagnostic characters* : Silvery with a faint shoulder spot.

24. *Ompok pabda* (Ham.) – Pabda/Pabo

*Size* : Grows to 17 cm.

*Habitat* : Freshwaters : rivers, beels, kharies.

*Behaviour* : Generally solitary, moving about close to the bottom in a serpentine motion. It is a voracious feeder. It hides among rocks and debris and the overall brownish colouration camouflaging the catfish and making it like a dead fish.

*Breeding* : Breeds during the monsoon.

*Diagnostic characters* : Usually silvery, glossed with gold and black shoulder spot above middle of pectoral fin and another generally close to base of caudal fin, silvery green with yellowish tinge, dark back fading to silver on abdomen, anal and caudal fins golden yellow when alive.

#### 25. *Wallago attu* (Schn.) – Boal

*Size* : Grows to 200 cm. and weighs up to 45-55 kg. It is the largest Indian freshwater fish.

*Habitat* : Freshwaters : big rivers and its tributaries, beels, tanks and channels.

*Behaviour* : The adult is predatory, aggressive and voracious feeder, preying on other fish. It stays at the bottom of the water in search of food. It is known to inflict painful bites when handled. It is a good sport fish. Breeding pairs are known to swim close to the surface in rivers.

*Breeding* : The breeding coincides with the rain.

*Diagnostic characters* : Large elongated, laterally flattened catfish with a wide mouth, small eyes and deeply forked tail. Uniform silvery, grey above becoming dull white below, in fresh specimen, a light greenish wash on the back and cream colour on the sides with a faint orange-yellow band along the lateral lines.

#### Family SCHILBEIDAE

Popularly known as schilbid catfish. The body is elongated and laterally flattened, the head is conical and the nostrils are wide spaced.

#### 26. *Ailia coila* (Ham.) – Kajri/Kajoli

*Size* : Grows to 18 cm.

*Habitat* : Freshwaters : rivers and its tributaries.

*Behaviour* : Inhabits surface to mid-water area, lives in shoals and feeds on submerged vegetation.

*Breeding* : Breeds during late rainy season.

*Diagnostic characters* : Skin smooth, silvery, some of the fins edged with grey, upper jaw longer and overhung by the snout.

#### Family CLARIIDAE

Popularly called air breathing catfish, possess a labyrinthine organ that enables them to breathe air directly. They have small eyes and four pairs of well-developed barbels.

#### 27. *Clarias batrachus* (Linn.) – Magur

*Size* : Grows to maximum 46 cm.

*Habitat* : Freshwaters : beels, ponds, kharies and flooded rice field and estuaries of rivers.

*Behaviour* : The adults stay buried in the bottom of the water bodies. Due to the ability to breathe air directly they can stay out of water for a long time and are known to move over wetlands in search of water. They are quite aggressive if handled, inflicting painful stings with their pectoral spines. The young individuals feed enormously.

*Breeding* : Breeds during the months of July-August coinciding with the monsoon. Most frequently, it breeds in the flooded rice field.

*Diagnostic characters* : Uniform rich reddish or greyish black, smooth skinned.

#### Family HETEROPNEUSTIDAE

Popularly called stinging or air sac catfishes, have a long internal sac enabling them to survive even out of water. The mouth is small and has four pairs of well-developed barbels.

#### 28. *Heteropneustes fossilis* (Bloch) – **Singhi**

*Size* : Grows to 30 cm.

*Habitat* : Freshwaters : rivers, beels, ponds, kharies, floodwater and ditches.

*Behaviour* : It can tolerate even turbid and muddy waters due to its ability to breathe air directly. The adults swim in shoals close to the bottom, being most active at night. Solitary adults stay within crevices and amongst debris with their barbels projecting outwards. They are very agile and when caught, can wriggle and inflict most painful stings. They can stay out of water for long periods. This species is known to stay below the surface of mud in wetland-bed coming back to life after the rains.

*Breeding* : Breeds during the monsoon in ditches and flood pools and spawns in a depression excavated by both the parents. The eggs are spherical, heavy and settle at the bottom, where they stick to the substrate.

*Diagnostic characters* : Dark purplish brown or leaden brown often with two yellowish lateral bands in juveniles.

#### Family BELONIDAE

Freshwater Gars have elongate, slender body with small scales. Both jaws elongated as a beak, armed with sharp teeth.

#### 29. *Xenentodon cancila* (Ham.) – **Kankley**

*Size* : Grows to 30 cm.

*Habitat* : Freshwaters : rivers, beels, lakes, ponds, kharies.

*Behaviour* : Surface dweller and carnivorous.

*Breeding* : Breeds during monsoon.

*Diagnostic characters* : Body elongate and both jaws lengthened into a long beak. It is greenish grey above and lighter below with abdomen whitish, a dark edged silvery stripe from eye to caudal fin base, often 4 or 5 black lateral blotches between pectoral and anal bases.

### Family CHANNIDAE

Large-mouth fishes with a snake-like head are popularly called snakeheads or murrels. Their bodies are long and cylindrical with dorsal and anal fins spreading over more than half of the body.

#### 30. *Channa marulius* (Ham.) – Sal/Gajal

*Size* : Grows to maximum 180 cm; normally, it measures around 50 cm. and can weigh as much as 30 kg.

*Habitat* : Freshwaters : rivers, beels, lakes, ponds, kharies, preferring deep water with rocky and sandy bottom.

*Behaviour* : Known to be territorial and aggressive. They are predatory, feeding on other fishes, water birds, snakes etc. The adults raise their young in nests and guard them intensely from intruders. They are also considered an excellent sport fish. They can directly breathe air and thus can stay alive for many hours without water.

*Breeding* : Breeds from April till June in specially built floating nests of weeds and leaves in which the orange yellow eggs are deposited.

*Diagnostic characters* : Large fish with a large, flattened snake like head and wide mouth. Colour greatly varies with environment, generally brown or greenish grey above, paler below, 4 to 5 large ocelli, dark brown with a hinder margin, lighter than ground colour on lateral line. L.I. 60-70.

#### 31. *Channa striatus* (Ham.) – Shol

*Size* : Grows to maximum 75 cm; normally they measure about 40 cm.

*Habitat* : Freshwaters : rivers, beels, tanks, ponds, kharies, large ditches and also in rivers.

*Behaviour* : Favours deep and still water. It is solitary, aggressive and highly predatory. The nesting pairs are known to attack when encountered. They also feed on other fish.

*Breeding* : The female matures at the age of one year. They breed during the rains. The eggs are amber coloured and over a thousand are laid in a nest of weeds, built in a tunnel like hollow.

*Diagnostic characters* : Dark greyish black above, dirty white and yellowish white beneath, greyish bands descend from sides to abdomen, fins greyish, a large black blotch may be found at the end of the base of dorsal fin when young. L.I. 50-57.

### 32. *Channa punctatus* (Bloch) – **Lata**

*Size* : Grows to 30 cm.

*Habitat* : Freshwaters : pond, ditches, lakes, rivers and estuaries.

*Behaviour* : Spotted snakeheads are generally solitary and predacious. They can stay a long period of time without water. They are also capable of leaping high and long out of water, when confined and turning around and biting the hand when caught: They feed mainly on other fish.

*Breeding* : Breeds throughout the year. It does not build a nest. The amber coloured floating eggs are laid in shallow water with a silty substrate.

*Diagnostic characters* : Colour varies with environment, generally greenish grey becoming yellow below, a dark stripe along the side of head and several short cross bands from back to middle of body, fins spotted. L.I. 37-40.

### Family CENTROPOMIDAE

Barramundis have oblong, elevated, moderately compressed body. Ctenoid scales on head to orbit only and body. Opercle with a strong spine. Anal and dorsal fins with a scaly sheath.

### 33. *Lates calcarifer* (Bloch) – **Bhetki**

*Size* : Grows to 152 cm.

*Habitat* : Coastal waters, estuaries and lagoons.

*Behaviour* : Carnivorous.

*Breeding* : Breeds in June-July. It comes down to the sea and spawn there. Spawning takes place in inshore water near the mouths of rivers during the rains.

*Diagnostic characters* : Ctenoid scales but not deciduous, lateral line uninterrupted extending to caudal fin. Colour green-like above and silvery below, eyes bright pink.

### Family NANDIDAE

Commonly called leaf-fishes have outwardly protruded large mouth and large spiny dorsal fin and rounded tail fin.

### 34. *Nandus nandus* (Ham.) – **Nadosh**

*Size* : Grows to maximum 20 cm.

*Habitat* : Fresh and brackish water : rivers, beels, tanks, ponds, paddy fields and kharies.

*Behaviour* : The leaf fish is generally shy and retiring fish, solitary and predatory in nature. It prefers to stay close to the rock and at the bottom in rather dark corners.

*Breeding* : Breeds during monsoon and very much common in summer months.

*Diagnostic characters* : Greenish brown with bronze to brassy reflections (when alive), 3 vertical broad bands (patches) over the body, a dark blotch on the free portion of tail, narrow bands or spots across the fins. L.l. 46-57.

### Family CICHLIDAE

It is a very large family of tropical freshwater fish, popularly known as cichlids. The species of this family vary enormously in size and shape. Some examples include exotic aquarium fishes such as the angelfish, oscar etc.

#### 35. *Oreochromis mossambica* (Peters) – **Tilapia/Telapia**

*Size* : Grows to maximum 25 cm, the normal size being much smaller.

*Habitat* : Freshwaters : tanks, ponds, kharies, floodwaters, ditches, mostly cultured areas.

*Behaviour* : The adults are aggressive and territorial, intolerant of both their own kind and other fish. The males scoop out circular pits in shallow water, which they then defend from intruders. Their large mouth enables them to carry away stones and debris while clearing the pits. They are omnivorous and dominate the water bodies where they occur.

*Breeding* : Breeds throughout the year. The females carry the fertilized eggs inside the large mouth and do not feed at that time.

*Diagnostic characters* : Greenish-olive to golden, each scale with a dark centre, vertical fins blackish with indistinct white spots, younger ones with one ovate black spot behind the base of the last dorsal spine. L.l. 28-36 (interrupted).

### Family MUGILIDAE

Commonly called Mulletts. Body oblong to elongate and compressed. Two dorsal fins short and widely separated.

#### 36. *Liza parsia* (Ham.) – **Parshey**

*Size* : Grows to 40 cm.

*Habitat* : Estuarine water : shallow coastal water and lagoons.

*Behaviour* : Carnivorous.

*Breeding* : Breeds during winter. It comes down to sea and spawns there.

*Diagnostic characters* : Body slender, head dorsoventrally flattened, greenish above with 3-6 stripes along row of scales. L.l. 31-36.

**37. *Liza tade* (Forsskal) – Bhangon**

*Size* : Grows to 47 cm.

*Habitat* : Estuarine water : shallow coastal water and lagoons.

*Behaviour* : Carnivorous.

*Breeding* : Breeds during winter. It comes down to sea and spawns there.

*Diagnostic characters* : Slender and elongated body, head much depressed and pointed. Body greenish brown above with a dark line along each row of scales. L.l. 30-35.

**38. *Rhinomugil corsula* (Ham.) – Kharsula**

*Size* : Grows to 31 cm.

*Habitat* : Freshwater : rivers and ponds.

*Behaviour* : Surface feeder and carnivorous.

*Breeding* : Breeds in winter in river.

*Diagnostic characters* : Body stout, head concave between eyes and the eyes projecting above the concave level. Dark brown dorsally and silvery below. L.l. 48-52.

**39. *Mugil cephalus* Linn. – Parshey**

*Size* : Grows to 91 cm.

*Habitat* : Seas, estuaries and rivers.

*Behaviour* : Carnivorous.

*Breeding* : Breeds in winter. During breeding season it comes down to sea.

*Diagnostic characters* : Body robust, head broad and much flattened. Olive green on back. 6-7 indistinct brown bands on the flanks. L.l. 38-42.

**Family POLYNEMIDAE**

Thread fins have oblong and somewhat compressed body. Head and body covered with small ctenoid scales. Pectoral fins divided into two sections, upper with rays attached and lower 3-7 extremely elongate, free filamentous rays. When the fish swims slowly in open water the free lower rays spread apart like the ribs of an umbrella.

**40. *Eleutheronema tetradactylum* (Shaw) – Gurjali**

*Size* : Grows to 180 cm.

*Habitat* : Inhabits sandy shore and muddy estuary.

*Behaviour* : Carnivorous.

*Breeding* : Breeds in August-September and during breeding it comes up to the estuary from sea.

*Diagnostic characters* : Body large, elongate and slightly compressed, eyes large. Silvery green above and yellowish white on belly and sides.

**Family GOBIIDAE**

Bottom-dwelling fishes, popularly called gobies. Gobies are generally cylindrical with a large head, relatively dorsally placed eyes, a two-lobed dorsal fin and a rounded tail fin.

**41. *Glossogobius giuris* (Ham.) – Beley**

*Size* : Grows to 30 cm.

*Habitat* : Fresh water : rivers, tanks, beels, ponds and kharies.

*Behaviour* : Generally sluggish in nature, taking advantage of its camouflaging colouration. The adults are bottom dwellers and prefer sandy and muddy substrate while the juveniles rest close to the shore of shallow water. They are predatory in nature and feed on other fishes.

*Breeding* : Known to enter the sea, possibly to breed. The eggs are green in colour and are firmly attached to the submerged objects such as logs.

*Diagnostic characters* : A long tapering fish with a somewhat vertically compressed and pointed head. Pelvic fins united and disc like and jugular in position. Transparent yellowish grey with 4 to 6 blotches on the body along the lateral line; L.l. 30-34.

**Family ANABANTIDAE**

Commonly called climbing perches. They have labyrinthine organ which helps to breathe in air. These are cylindrical fishes with large heads and gill covering that are often armed with spines. The dorsal fin also bears well-developed spines.

**42. *Anabas testudineus* (Bloch) – Koi**

*Size* : Grows to maximum 25 cm. but they are normally much smaller.

*Habitat* : Swamp, ditches, beels, kharies, tanks, ponds and estuaries.

*Behaviour* : The adults are solitary and aggressive and are associated with turbid and stagnant water over grown with aquatic vegetation. This is capable of breathing air directly and survives many hours without water. It is known to walk across land in search of water during summer. Using the spine of gill cover the adults can wriggle up crevices and even into hollow tree trunks that are close to water, thus earning the title of climbing perch.

*Breeding* : The eggs are scattered in open water at the onset of rains without any nest. The male wraps itself on the female's body, fertilizing the eggs as they are laid.

*Diagnostic characters* : Obong body, laterally compressed with wide head. Greyish green above, greenish yellow or reddish yellow below, 4 wide cross bands on body. Sometimes a black spot on caudal base; L.l. 28-32.

#### Family BELONTIDAE

Popularly called labyrinth fishes. They are air breathers owing to the presence of labyrinthine organ. They build bubble-nests.

#### 43. *Colisa fasciatus* (Schneider) – **Khalisa**

*Size* : Grows to maximum 5 cm.

*Habitat* : Freshwaters : beels, kharis, tanks, ponds, ditches and rivers.

*Behaviour* : Generally peaceful in nature and given to staying in shoals. It is also shy and often hides beneath aquatic plants. Individuals move up together, cautiously, with the pectoral fins projected forward and held stiffly like feelers, come to the surface, take in air and then dive deep down to the bottom of the pool. This is a bubble nest builder and the adults disperse widely during the flood.

*Breeding* : The eggs are laid within a bubble nest that is built on the surface between submerged plants. The males guard the nest, eggs and young until the fry are able to swim freely.

*Diagnostic characters* : Greenish or bluish above, dirty white below, 14 or more orange (mixed with red) coloured vertical bands descend obliquely downwards from back to belly and bordered by blue bands, eyes red, ventral fins edged with red, dorsal and caudal fins spotted with orange. L.l. 29-31.

#### Family MASTACEMBELIDAE

Popularly called spiny eels. These are built like snakes, with long and soft snouts.

#### 44. *Mastacembelus armatus* Lacepede – **Banmachh, Bam/Bami**

*Size* : Grows to 75 cm.

*Habitat* : Fresh water : rivers; beels, tanks, kharies, ponds, ditches.

*Behaviour* : The fish is solitary in nature swimming mostly in the mid waters and prefers water bodies with sand, boulder or pebble substrate. The adults tend to hide within cavities of burrow into the bottom while at rest. They feed along the bottom and sides, by probing the detritus with their long snouts. They are fond of taking live food, especially worms buried in the bottom. They move about at night.

*Breeding* : The females carry eggs and are stouter and sometimes the eggs are visible through the pale skin.

*Diagnostic characters* : An eel shaped elongated fish, rich brownish above and light grey below and sides, undulating dark brown patterns between back and lateral line, more prominent at the posterior end; a black narrow line through the eye.

#### 45. *Macrogathus pancalus* Ham.– Pankal/Turi

*Size* : Grows to 18 cm.

*Habitat* : Fresh water : rivers, beels, tanks, kharies, ponds, ditches.

*Behaviour* : Solitary in nature swimming mostly in the mid waters and prefers water bodies with sand, boulder or pebble substrate. They feed along the bottom and sides, by probing the detritus with their long snouts. They are fond of taking live food.

*Breeding* : Not yet known.

*Diagnostic characters* : An eel shaped fish with tapering head and tail. Greenish olive above, yellowish below, yellowish white spots on scales.

#### 46. *Macrogathus aral* (Bloch) – Goichi

*Size* : Grows to 38 cm.

*Habitat* : Fresh water : rivers, beels, tanks, kharies, ponds, ditches.

*Behaviour* : Solitary in nature swimming mostly in the mid waters and prefers water bodies with sand, boulder or pebble substrate. They feed along the bottom and sides, by probing the detritus with their long snouts. They are fond of taking live food.

*Breeding* : Not yet known.

*Diagnostic characters* : An eel shaped fish, devoid of preorbital spine, with distinct lateral line and shorter lower jaw.

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