

OBSERVATIONS ON THE ICHTHYOFAUNAL CONSTITUENTS RESTRICTED TO THE INDIAN SUBCONTINENTAL COASTAL WATERS

S. S. MISHRA and S. KRISHNAN

*Marine Biological Station, Zoological Survey of India,
Madras 600 028*

INTRODUCTION

Ichthyofaunal diversity of the Indian subcontinental coastal waters is relatively high and consists of approximately 2000 reliably recorded species (Talwar, 1991). At least 27% of these species contribute to fishery either at a major or minor level. Endemics contribute 10% to the commercially exploited species of India. The one notable feature is the presence of 143 species of fishes belonging to 49 families in the Indian subcontinental coastal and shelf waters (between 60°E and 95°E) and are not found anywhere else in the world. This category of peripherally evolved marine and coastal fishes is very important from several points of view including conservation of biodiversity and optimal development of living resources. Areas of high proportion of narrow endemic species contribute to global diversity more than other areas with similar numbers of species but less endemism. Thus, biological degradation in such areas reduce diversity more than anywhere else. Narrow endemics are perhaps most vulnerable. Natural vulnerability is more for top level carnivores, species with poor colonising ability, those with colonial nesting habits, migratory species and species with little evolutionary experience (Anon., 1988). Limited information is available to the academics and conservationists about non-commercial fish resources. In addition, wherever fishery value exists information does not percolate to the species level. Determining patterns of species richness in areas may be valuable as an adjunct to managing those areas and in detecting centres of biodiversity, "hot spots", centres of endemism, critical faunas and other parameters used to accord conservation priority (Vane-Wright *et al.*, 1991). The majority of publications do not provide comprehensive scientific information, the lacuna remains unfilled for want of precise information on availability or otherwise of fish species found in our area. At this stage in our knowledge, we can perhaps obtain only a very general indication of endemism by examining the results of some recent systematic work on certain groups of fishes (Briggs, 1974). Hence attention is drawn to the fact that this work is not conclusive but with emphasis to know more and to disseminate information.

MATERIALS and METHODS

Fish samples in the holdings of Marine Biological Station, ZSI, Madras have been examined. Taxonomic and systematic information along with fishery details have been gathered from numerous sources including databases from the governmental and non-governmental sectors. They were classified according to habitats, fishery value, IUCN categorisation and other relevant factors. Statistical analysis has been deliberately avoided to (1) exclude skewed landing details and (2) to present the data in simple terms.

RESULTS

The retrieved information about 143 species of fishes belonging to 49 families are presented in Table 1.

TABLE 1

Fishes restricted to Indian coastal waters.
(Arrangement of taxa after Nelson, 1984)

GROUP I : *Commercially valuable fishes*

Taxa	Distribution
Family : CARCHARHINIDAE	
1. <i>Glyphis gangeticus</i> (Muller & Henle, 1891)	: Indus and Ganges riverine and estuarine systems ; possibly in inshore waters.
Family : RHINOBATIDAE	
2. <i>Rhinobatos annandalai</i> Norman, 1926	: Coasts of India ; marine, occasionally enters estuaries.
3. <i>R. lionotus</i> Norman, 1926	: Hooghly ; estuarine.
Family : DASYATIDAE	
4. <i>Dasyatis microps</i> (Annandale, 1908)	: East coast of India, Bangladesh ; inshore waters.
5. <i>Himantura marginata</i> (Blyth, 1861)	: India, Sri Lanka, Myanmar ; Inshore waters, enters estuaries.

Family : MYLIOBATIDAE

6. *Rhinoptera sewelli* Misra, 1946 : Southwest coast (Kerala) of India ; marine.

Family : CLUPEIDAE

7. *Corica soborna* Ham.-Buch., 1822 : Gangetic system ; riverine, frequents coastal inshore waters.
8. *Sardinella dayi* Regan, 1917 : Southern costs of India, Sri Lanka ; marine.
9. *Tenualosa ilisha* (Ham.-Buch., 1822) : Persian Gulf to Myanmar ; marine, pelagic, schooling in coastal waters, entering into rivers during spawning migration.

Family : ENGRAULIDIDAE

10. *Coilia ramcarati* (Ham.-Buch., 1822) : Gangetic delta and Andaman seas : marine, pelagic, entering estuaries.
11. *C. reynaldi* Valenciennes, 1848 : East coast of India to Myanmar ; coastal, entering tidal rivers.
12. *Setipinna phasa* (Ham.-Buch., 1822) : Ganges system, Coastal waters of Orissa ; riverine and estuarine.
13. *Thryssa gautamiensis* Babu Rao, 1971 : East coast of India ; marine, pelagic, inshore, entering estuaries.
14. *T. malabarica* (Bloch, 1795) : Coasts of India, Sri Lanka ; marine, inshore waters, pelagic, entering estuaries.
15. *T. purava* (Ham.-Buch., 1822) : Coasts of India, Sri Lanka, Bangladesh ; marine, inshore waters, pelagic, entering estuaries.

Family : ARIIDAE

16. *Arius arius* (Hamilton, 1822) : Pakistan, India, Bangladesh, Myanmar ; Coastal waters, estuaries, tidal rivers and brackish water lakes.
17. *A. jella* Day, 1877 : East coast of India, Sri Lanka, Myanmar ; coastal, inshore, estuaries and brackish waters.
18. *A. platystomus* Day, 1877 : India, Sri Lanka ; coastal waters and estuaries.

19. *A. subrostratus* Valenciennes, 1840 : Pakistan, southern coasts of India, Sri Lanka ; seas, estuaries and tidal rivers.
- Family : PLOTOSIDAE
20. *Plotosus limbatus* Valenciennes, 1840 : Southern coast of India, Sri Lanka ; estuaries and inshore waters.
- Family : HEMIRAMPHIDAE
21. *Rhynchorhamphus malabaricus* Collette, 1976 : Southern coasts of India, Sri Lanka ; inshore waters.
- Family : PLATYCEPHALIDAE
22. *Suggrundus bengalensis* (Rao, (1966) : East coast of India ; marine.
- Family : AMBASSIDAE
23. *Parambasis dayi* (Bleeker, 1874) : Western ghats of Kerala & Vembanad lake : freshwater and estuaries.
24. *P. thomasi* (Day, 1870) : Western ghats of Kerala & Karnataka, Vembanad lake ; freshwater, estuaries.
- Family : HAEMULIDAE
25. *Plectorhinchus ceylonensis* (Smith, 1956) : Sri Lanka, likely to occur in Indian inshore waters.
26. *P. griseus* (Cuvier, 1830) : West coast of India, Sri Lanka ; coral reefs and inshore waters.
- Family : GERREIDAE
27. *Gerres limbatus* Cuvier, 1830 : Seas of India ; marine.
28. *G. setifer* (Ham.-Buch., 1822) : East coast of India, Sri Lanka ; inshore waters and estuaries.
- Family : SILLAGINIDAE
29. *Sillago indica* Mc Kay, Dutt & Sujatha, 1985 : Coasts of India ; inshore waters.
30. *S. soringa* Dutt & Sujatha, 1983 : East coast of India, inshore sandy bottom.
31. *S. vincenti* Mc Kay, 1980 : Southern coast of India ; coastal, inshore waters.
- Family : SCIAENIDAE
32. *Daysciaena albida* (Cuvier, 1830) : India, Sri Lanka, possibly extending eastward ; coastal waters, estuaries, ascending backwater.

33. *Johnieops aneus* (Bloch, 1793) : West coast of India, Pakistan, Sri Lanka ; marine.
34. *J. macrorhynchus* Mohan, 1976 : India, Sri Lanka, eastward to Singapore ; marine
35. *Johnius carouna* (Cuvier, 1830) : Southern coast of India, Nicobar Island ; coastal inshore waters, estuaries and backwaters.
36. *J. elongatus* Mohan, 1976 : West coast of India ; coastal waters.
37. *J. gangeticus* Talwar, 1991 : Gangetic system (Sunderbans) ; rivers and estuaries.
38. *J. glaucus* (Day, 1876) : West coast of India ; marine.
39. *J. mannarensis* Mohan, 1969 : South-east coast of India, Sri Lanka ; marine.
40. *Kathala axillaris* (Cuvier, 1830) : India, Sri Lanka ; inshore waters.
41. *Macropsinosa cuja* (Ham.-Buch., 1822) : Gangetic estuaries.
42. *Otolithes cuvleri* Trewavas, 1974 : Pakistan, India, Sri Lanka ; inshore and coastal waters.
- Family : LEIOGNATHIDAE
43. *Leiognathus jonesi* James, 1971 : South-east coast of India, Andamans ; coastal, marine.
- Family : CICHLIDAE
44. *Etroplus suratensis* (Bloch, 1785) : South-west and east coasts of India, Sri Lanka ; inshore waters and estuaries.
- Family : MUGILIDAE
45. *Liza parsia* (Ham.-Buch., 1822) : Pakistan, India (including Andamans), Sri Lanka ; shallow coastal waters.
- Family : POLYNEMIDAE
46. *Polydactylus sexfilis* (Val., 1831) : Coasts of India ; marine.
47. *Polynemus paradiseus* Linnaeus, 1758 : Pakistan, India, Sri Lanka ; shallow sandy inshore waters, entering rivers during breeding season.
- Family : TRICHIURIDAE
48. *Lepturacanthus pantului* (Gupta, 1966) : East coast of India ; benthopelagic/pelagic, coastal waters, estuaries.

49. *Trichiurus gangeticus* Gupta, 1966 : East coast of India ; coastal waters and estuaries.

Family : BOTHIDAE

50. *Pseudorhombus micrognathus* Norman, 1927 : North-east coast of India ; marine.

Family : CYNOGLOSSIDAE

51. *Cynoglossus dispar* Day, 1877 : Pakistan, West coast of India ; marine.
 52. *C. dubius* Day, 1873 : Pakistan, West coast of India ; inshore waters.
 53. *C. macrostomus* Norman, 1928 : Coasts of India ; shallow sandy bottom of shelf, entering estuaries.
 54. *C. semifasciatus* Day, 1877 : East coast of India ; muddy and sandy bottom of shelf.

Family : SOLEIDAE

55. *Zebrias synapturoides* (Jenkins, 1910) : South-west and East coasts of India ; inshore waters.

GROUP II : *Common but non-commercial fishes*

Family : SCYLIORHINIDAE

56. *Cephaloscyllium silasi* (Talwar, 1974) : South-west coast of India ; benthic, on the upper most continental slope at a depth of 300 mtrs.
 57. *Halaehurus hispidus* (Alcock, 1891) : Andamans & Gulf of Mannar ; benthic, deep water.

Family : SYNODONTIDAE

58. *Saurida longimanus* Norman, 1939 : Pakistan & north-west coast of India ; marine.

Family : HEMIRAMPHIDAE

59. *Hyporhamphus xanthopterus* (Val., 1846) : South-west coast of India ; estuarine.

Family : SYNGNATHIDAE

60. *Hippocampus branchyrhynchus* Dunker, 1914, : Chilka lake (India) and Mekran coast (Pakistan) ; brackish waters.

61. *Microphis branchyurus* (Bleeker, 1853) : Southern India, Nicobar Islands, Sri Lanka ; estuaries and freshwater.
62. *M. cuncalus* (Ham.-Buch., 1822) : India, Bangladesh, Sri Lanka ; freshwater, estuaries, low saline habitats.
- Family : TRIGLIDAE
63. *Lepidotrigla riggsi* Richards & Saksena, 1977 : Southern coasts of India, Andaman sea ; marine.
- Family : SCIAENIDAE
64. *Atrobucca trewavase* Talwar & Sathiarajan, 1974 : South-east coast of India ; deep waters.
- Family : LABRIDAE
65. *Xyrichtys cyanifrons* Val. 1840 : Southern coasts of India ; marine.
- Family : URANOSCOPIDAE
66. *Ichthyscopus inermis* Cuvier, 1829 : Coasts of India ; marine
67. *Uranoscopus guttatus* Cuvier, 1829 : Coasts of India ; marine
- Family : CALLIONYMIDAE
68. *Synchirops lineolatus* (Val., 1837) : India (Madras, Andamans) ; marine.
- Family : GODIIDAE
69. *Acentrogobius griseus* (Day, 1876) : South-east coast of India ; brackish-waters.
70. *A. madraspatensis* (Day, 1868) : South-east coast of India ; backwaters.
71. *A. masoni* (Day, 1873) : Coasts of India ; marine and backwaters.
72. *Apocryptus bato* (Ham.-Buch., 1822) : India, Bangladesh, Myanmar ; marine to freshwater.
73. *Awaous gutum* (Ham.-Buch., 1822) : India, Bangladesh ; rivers and estuaries.
74. *Bathygobius ostreicola* (Choudhuri, 1916) : East coast of India ; estuaries.
75. *Boleophthalmus dussumieri* Val., 1837 : Iraq, Pakistan, India, Bangladesh ; seas and estuaries.
76. *Callogobius seshaiyai* Jacob & Ranganath, 1960 : South-east coast of India ; estuaries.

77. *Gobiopsis macrostoma* Steindachner, 1860 : India, Thailand ; coastal waters and estuaries.
78. *Mugilogobius valigouva* (Deraniyagala, 1936) : Sri Lanka, India (Goa) ; estuaries.
79. *Oligolepis cylindriceps* (Hora, 1923) : India (Chilka, Ennore estuary, Cochin backwaters) ; brackish waters.
80. *Parachaeturichthys ocellatus* Day, 1873 : Pakistan, North-west coast of India ; marine.
81. *Parapocryptes rictuosus* (Val., 1837) : West coast of India ; marine and brackish waters.
82. *Periophthalmus pearsi* Eggert, 1935 : India (West Bengal), Bangladesh, Myanmar ; marine and brackish waters.
83. *Sicyopterus griseus* (Day, 1876) ; Southern coasts of India ; estuaries and backwaters.

Family : GOBIOIDIDAE

84. *Taenioides buchanani* (Day, 1873) : East coast of India, Myanmar ; estuarine.

Family : SOLEIDAE

85. *Synaptura albomaculatus* Kaup, 1858 : East coast of India, Bangladesh, Myanmar ; shallow coastal waters, estuaries.

GROUP III : *Less frequent ; commercial fishes*

Family : CLUPEIDAE

86. *Dayella malabarica* (Day, 1873) : South-west coast of India ; rivers, estuaries.
87. *Ehirava fluviatilis* Deraniyagala, 1929 : Southern coasts of India, Sri Lanka ; estuaries, lagoons, tidal rivers.

Family : PRISTIGASTERIDAE

88. *Pellona dayi* Wongratana, 1983 : East coast of India, Great Nicobar Island ; marine.

Family : ENGRAULIDIDAE

89. *Thryssa dayi* Wongratana, 1983 : Pakistan, West coast of India, marine, pelagic, inshore waters.
90. *T. polybranchialis* Wongratana, 1983 : Coasts of India, Sri Lanka ; marine pelagic, schooling.
91. *T. spinidens* (Jordan & Seale, 1925) : India (West Bengal) to Thailand ; marine, inshore, pelagic.
92. *T. stenosoma* Wongratana, 1983 : North-east coast of India, Bangladesh, Myanmar ; estuarine, inshore waters.

GROUP IV : *Less frequent, non-commercial fishes*

Family : SQUALIDAE

93. *Centroscyllium ornatum* (Alcock, 1889) : North Arabian Sea and North Bay of Bengal ; deep sea form from upper continental slope.

Family : MURAENIDAE

94. *Lycodontis punctatus* (Bl. & Schn., 1801) : East coast of India ; marine.
95. *L. sathete* (Ham.-Buch., 1822) : Hooghly estuary.

Family : MORINGUIDAE

96. *Moringua arundinacea* (McClelland, 1844) : Gangetic estuaries.
97. *M. raitaborua* (Ham.-Buch., 1822) : Gangetic estuaries.

Family : OPHICHTHIDAE

98. *Caecula pterygea* Vahl, 1794 : Southern coasts of India ; estuaries and inshore waters.
99. *Ophichthus microcephalus* (Day, 1870) : West coast of India ; marine.
100. *O. ornatissimus* (Kaup, 1856) : West coast of India ; marine.

Family : BATRACHOIDIDAE

101. *Austrobatrachus dussumieri* (Val., 1829) : Pakistan, West coast of India, Sri Lanka ; estuaries.

Family : PLATYCEPHALIDAE

102. *Rogadius serratus* (Cuvier, 1829) : India (Minicoy) ; marine.

Family : AMMODYTIDAE

103. *Ammodytus kalollepis* Gunther, 1862 : Coasts of India ; sandy inshore waters.

Family : BLENNIDAE

104. *Alticus andersoni* (Day, 1878) : Andaman Islands ; marine

Family : CALLIONYMIDAE

105. *Callionymus orientalis* Bl. & Schn., 1801 : South-east coast of India ; estuaries, inshore waters.

Family : GOBIIDAE

106. *Boleophthalmus dentatus* Val., 1837 : West coast of India ; marine, estuaries.
107. *Stigmatogobius minima* (Hora, 1923) : India (Chilka, Godavari estuary) ; brackish waters.

Family : TRYPACHENIDAE

108. *Amblytrypauchen arctocephalus* (Alcock, 1890) : Hooghly estuary.

Family : ELEOTRIDAE

109. *Eleotris lutea* Day, 1876 : India (West Bengal, Andamans), Myanmar) ; estuaries.

Family : BOTHIDAE

110. *Cephalopsetta ventrocellatus* Dutt & Rao, 1965 : East coast of India ; marine.

GROUP V : *Rare fishes*

Family : SCYLIORHINIDAE

111. *Apristurus investigatoris* (Misra, 1962) : Andaman Sea ; deepwater, bottom dwelling.

Family : RHINOBATIDAE

112. *Rhinobatos variegatus* Nair & Mohan, 1973 : Gulf of Mannar ; marine.

Family : MURAENIDAE

113. *Echidna nigra* (Day, 1870) : Andamans ; reef dwelling.

Family : OPHICHTHIDAE

114. *Bascanichthys deraniyagalai* Menon, 1961 : South-east coast of India (Karaikal), Sri Lanka ; estuaries.

Family : SERREVOMERIDAE

115. *Serrevomer microps* (Alcock, 1889) : Andaman Sea ; deep water.

Family : SCORPANEIDAE

116. *Setarches longimanus* (Alcock, 1894) : Andaman Sea ; deep water.

Family : PRISTIGASTERIDAE

117. *Ilisha obfuscata* Wongratana, 1983 : India (Pondicherry & Bombay) ; marine.

Family : ENGRAULIDIDAE

118. *Thryssa kammalensoides* Wongratana, 1983 : India (Godavari estuary and nearby inshore waters).

Family : ARIIDAE

119. *Arius gogora* (Hamilton, 1822) : India (West Bengal, Orissa), Bangladesh ; estuaries, tidal rivers.
120. *A. parvipinnis* Day, 1877 : East coast of India ; marine.
121. *Hemipimeladus jattus* (Hamilton, 1822) : India (West Bengal, Orissa), Bangladesh, Myanmar ; estuaries, rivers.

Family : APOGONIDAE

122. *Apogon nigricans* Day, 1875 : East coast of India (Madras) ; marine.

Family : NEMIPTERIDAE

123. *Parascolopsis boesemani* Rao & Rao, 1981 : East coast of India (Waltair) ; marine.

Family : SCIAENIDAE

124. *Bahaba chaptis* (Ham.-Buch., 1822) : Hooghly estuary, Myanmar ; coastal waters, tidal rivers.
125. *Panna heterolepis* Trewavas, 1977 : Hooghly estuary.

Family : LEIOGNATHIDAE

126. *Leiognathus striatus* James & Badruddin, 1991 : Gulf of Mannar ; marine.

Family : BLENNIDAE

127. *Istiblennius dayi* (Whitley, 1929) : Andamans ; coastal.

Family : GOBIIDAE

128. *Bathygobius macrocephalus* (Rao, 1968) : East coast of India ; inter-tidal rock pools.
129. *Boleophthalmus sculptus* Gunther, 1861 : West coast of India (Bombay); coastal.
130. *Callogobius andamanensis* Menon & Chatterjee, 1974 : Andaman Islands ; coastal.
131. *Cottogobius kapuri* Rao, 1976 : East coast of India (Godavari estuary).
132. *Chiramenu fluviatilis* Rao, 1970 : East coast of India (Godavari estuary).
133. *Oxyurichthys dasi* Talwar *et al.*, 1982 : Andaman Islands ; coastal.
134. *O. talwari* Mehta *et al.*, 1989 : Andaman Islands ; coastal.
135. *Pogonogobius planifrons* (Day, 1873) : West coast of India (Bombay) ; coastal.
136. *Silhouttea indicus* Rao, 1971 : East coast of India (Godavari estuary).
137. *Scartelaos glaucus* (Day, 1876) : Andaman Islands ; coastal.

Family : ELEOTRIDAE

138. *Incara multisquamatus* Rao, 1971 : East coast of India (Godavari estuary).
139. *Eleotris andamanensis* Herre, 1939 : Andaman Islands ; coastal.
140. *Ptereleotris andamanensis* Herre, 1939 : Andaman Islands ; coastal.

Family : SIGANIDAE

141. *Siganus peulloides* Woodland & Randall, 1979 : Maldives, Similan Islands, isolated islands of west coast of Thailand, possibly Andaman Nicobar Islands.

Family : TETRAODONTIDAE

142. *Arothron leopardus* (Day, 1878) : Coasts of India ; marine.
143. *Canthigaster investigatoris* (Annandale & Jenkins, 1914) : Andaman sea ; marine.

DISCUSSION

The fauna of Indo-west Pacific region is incredibly rich with a species diversity that far exceeds that of the tropical regions. It possesses many families which are not found anywhere else—Pegasidae, Sillaginidae, Kraemeriidae, Siganidae, etc., while other tropical regions possess very few (Briggs, 1974). Indian coastal waters are important

from taxonomic point of view as one of the peripheral areas in the evolution of marine fish species. A numerical analysis of fish species is necessary before having a cursory look at the distribution patterns. A close scrutiny indicates the presence of 143 species of endemics (55 species in the east coast, 25 in the west coast, 48 in both the coasts and 15 enjoying insular distribution).

There are 46 narrow endemic species of fishes found in pockets. The major pockets of occurrence are (i) the Gangetic estuaries (12 species : *Glyphis gangeticus*, *Rhinobatos lionotus*, *Lycodontis sathete*, *Moringua arundinacea*, *M. raitaborua*, *Corica soborna*, *Setipinna phasa*, *Bahaba chaptis*, *Johnius gangeticus*, *Macrospinosa cuja*, *Panna heterolepis*, and *Amblytrypauchen arctocephalus*), (ii) Godavari estuaries (6 species : *Thryssa kammalensoides*, *Cottogobius kapuri*, *Callogobius seshaiyai*, *Chiramenue fluviatilis*, *Silhouttea indicus* and *Incara multisquamatus*), (iii) Estuarine systems and coastal belt of Kerala (6 species : *Cephaloscyllium silasi*, *Rhinoptera sewelli*, *Dayella malabarica*, *Hyporhamphus xanthopterus*, *Parambasis dayi* and *P. thomasi*), (iv) the Gulf of Mannar, (3 species : *Halaelurus hispidus*, *Rhinobatos variegatus* and *Leiognathus striatus*) and (v) Seas around Andaman Islands (12 species : *Alticus andersonii*, *Callogobius andamanensis*, *Canthigaster investigatoris*, *Echidna nigra*, *Eleotris undamanensis*, *Istiblennius dayi*, *Oxyurichthys dasi*, *O. talwari*, *Ptereleotris andamanensis*, *Scartelaos glaucus*, *Serrevomer microps* and *Setarches longimanus*. These pockets should be earmarked for conservation purposes with appropriate legislation and enforcement of law. We may even call them as "hot spots" requiring stringent measures to protect the ecosystem as a whole rather than trying to save dwindling species. The other 5 narrow endemics, viz. *Ilisha obfuscata* (known from Pondicherry and Bombay) *Hippocampus branchyrhynchus* (Chilka lake and Pakistan), *Rogadius serratus* (Minicoy Islands), *Apogon nigricans* (Madras coast) and *Parapocryptes rictuosus* (Chilka lake and Ennore estuary) have to be appropriately taken care of.

Out of the 143 species of fishes discussed here, 55 are of common occurrence with fishery value either at a major or minor level, 30 are commonly occurring with no interest to fisheries and passed on as trash fish, 7 are less frequent in commercial catches, 18 are less frequent and non-commercial and 33 species are rare.

In the recent years catch statistics indicate a fluctuating trend qualitatively and quantitatively for common commercial fishes. Especially in the case of *Tenualosa ilisha* catches are fast declining all over the range, more drastically in the Gangetic estuarine system perhaps due to habitat destruction (Talwar and Jhingran, 1991; Chandra Ravish, 1994; Kotwal, 1994; Mukhopadhyay, 1994). It is suspected that individual populations of *T. ilisha* are often isolated and that distinct races exist in the different river systems (Pillay and Rosa, 1963). These races are also susceptible. This species

can be considered vulnerable under IUCN categorisation. For most of the commercial fishes, species specific catch details are not available to arrive at any tangible conclusions. There are many taxonomic hurdles acting as stumbling blocks in the identification of species in the genera *Arius* (Jayaram, 1982), *Ilisha*, *Pellona*, *Sardinella* (Whitehead, 1985; Sivakumaran *et al.*, 1989), *Setipinna*, *Thryssa* (Whitehead *et al.*, 1988) and *Sillago* (Mc Kay, 1992).

In order to avoid destruction of non-commercial but commonly occurring species, it is necessary to evolve suitable methods to reduce the quantum of by-catches. This category needs attention since the germ plasm may be lost in the long run without being noticed by us. The catches of less frequently occurring commercially viable species should be augmented by encouraging replenishment of brood stock in natural environments. Ichthyological and fishery information are needed for *Pellona dayi*, *Thryssa dayi*, *T. polybranchialis*, *T. spinidens* and *T. stenosoma* (Whitehead *et al.*, 1988). The less frequent non-commercial and rare species have to be considered for conservation and to maintain natural biodiversity.

Between 1961 and 1992 occurrence of 17 species (of coastal fishes) as new to science has been reported from India and they are known by types only. Two species (*Apristurus investigatoris* and *Panna heterolepis*) are known by the juveniles only and their adult configuration is not known. Further, *Apogon nigricans*, *Arothron leopardus*, *Bahaba chaptis* (known by 8 specimens only), *Boleophthalmus sculptus*, *Canthigaster investigatoris* (known by 2 specimens only), *Echidna nigra*, *Eleotris andamanensis*, *Istiblennius dayi*, *Pogonogobius planifrons*, *Ptereleotris andamanensis*, *Scartelaos glaucus*, *Serrevomer microps*, and *Setarches longimanus* do not find a mention in the literature for the past 50 years. More searches have to be made for these species. In the recent years not a single sample of *Arius gajus* and *Hemipimelodus fatus* could be collected even from the locality where they were abundant earlier (Talwar and Jhingran, 1991). Occurrence of *Arius parvipinnis* has also become rare these days. They are thus critically endangered and call for immediate protection measures.

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REFERENCES

- Anon., 1988. *Technologies to maintain Biological Diversity*. Science Information Resource Center, Philadelphia : 1-334.
- Briggs, J. C., 1974. *Marine Zoogeography*. Mc Graw-Hill, New York : 1-475.
- Chandra Ravish, 1994. Some endangered, vulnerable and rare miscellaneous fishes of Ganga River System : *Hilsa ilisha* (Ham.) and *Setipinna phasa* (Ham). *Threatened fishes of India*. Natcon Publication : 7-11.
- Jayaram, K. C., 1982. Aid to the identification of the Siluroid fishes of India, Burma, Sri Lanka, Pakistan and Bangladesh. 5. Ariidae and Plotosidae. *Rec. Zool. Surv. India, Occ. Paper*, (37) : 1-41.
- Kotwal, G. V., 1994. Endangered, vulnerable and rare food fishes of the east coast river system. *Threatened fishes of India*. Natcon Publication : 57-61.
- Mc Kay, R. J., 1992. Sillaginid fishes of the world (Family Sillaginidae). *FAO Fish. Synop.*, (125) 14 : 1-87.
- Mukhopadhyay, M. K., 1994. Some threatened estuarine fishes of India. *Threatened fishes of India*. Natcon Publications : 229-235.
- Nelson, J. S., 1984. *Fishes of the World*. John Wiley & Sons, New York : 1-523.
- Pillay, S. R. and Rosa, H., 1963. Synopsis of biological data on *Hilsa ilisha* (Hamilton, 1822). *FAO Fish. Synop.*, (25) : 1-70.
- Sivakumaran, K. P., Manickasundaram, M. and Ramaiyan, V., 1989. Problems of identification among species of *Sardinella*. *Cent. Mar. Fish Res. Inst, Bull* , 44(1) : 223-226.
- Talwar, P. K., 1991. Pisces. *Animal Resources of India : Protozoa to Mammalia*. Ed. Director, Z. S. I., Calcutta : 577-630.
- Talwar, P. K. and Jhingran, A. G. 1991. *Inland Fishes of India and adjacent countries*. Oxford and IBH, New Delhi, 1 & 2 : 1-1158.

- Vane-Wright. R. I. Humphries, C. J. and Williams, P. H., 1991. What to protect?—systematics and the agony of choice. *Biol. Conserv.*, 55 : 235-254.
- Whitehead. P. J. P., 1985. Clupeoid fishes of the world (Suborder Clupeioidi). *FAO Fish. Synop.*, (125) 7(1) : 1-303.
- Whitehead, P. J. P., Nelson. G. J. and Wongratana, T., 1988. Clupeoid Fishes of the world (Suborder Clupeioidi). *FAO Fish. Synop.*, (125) 7(2) : 305-577.
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