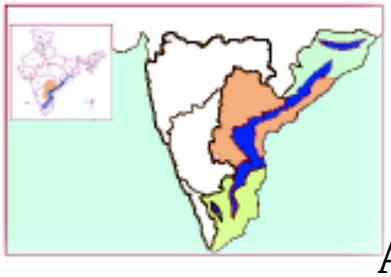


Volume 12 No.3, 2006

The Eastern Ghats

EPTRI - ENVIS Newsletter

Aquatic Faunal diversity in Eastern Ghats

Contents

The ENVIS Centre on Eastern Ghats is a decentralized environmental information centre established by the Ministry of Environment & Forests, Government of India.

Foreword

Our endeavour has been to bring out the Newsletter 'The Eastern Ghats' on issues considered as data gaps. The jurisdiction of the ecologically fragile region is vast and in some instances the hill region intrudes into the marine waters and gives rise from gradual to steep gradients forming continental shelves that harbour benthic organisms that serve as food for some of the endangered marine fauna like Hawksbill Turtle, Green Turtle and Olive Ridley.

In this context, the aquatic fauna of the Eastern Ghats would cover fauna of both the fresh water and marine environment. The theme: '*Aquatic faunal diversity of the Eastern Ghats*' covers a diverse range of species from zooplanktons to aquatic mammals.

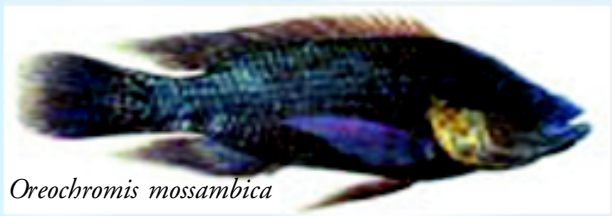
This issue includes articles received from scientists of the National Bureau of Fish Genetic Resources, Lucknow and a pertinent Paper from scholars from Acharya Nagarjuna University, Guntur. The emphasis of both the articles is on fish diversity in the Eastern Ghats region. The selection of abstracts range from the effects of shrimp farming; aquatic faunal diversity in Chilika Lake; important nesting habitats of Olive Ridley turtles; new species of snails etc.

ENVIS Coordinator

Carassius carassius

Poecilia reticulate

Hypophthalmichthys molitrix



Oreochromis mossambica

Gambusia affinis

Oreochromis niloticus

The forthcoming issue would also be on *Aquatic faunal diversity of the Eastern Ghat.* Articles, write-ups and news items on the theme are invited from our readers.

The mailing list is being revised to affect some dispatches by designations, in cases of organizational and institutional addresses, as we have received some issues undelivered. We request our readers to kindly intimate by e-mail any change of postal (or e-mail) addresses with names and contact details of others who may be interested in receiving a copy of the Newsletter.

Evaluation of Fish Biodiversity of Eastern Ghats Region for Conservation and Sustainable Utilization

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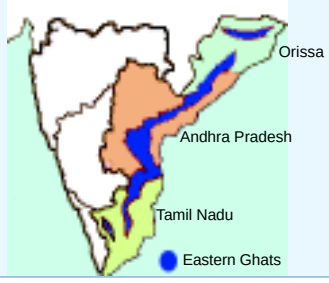
Introduction

India is one of the mega biodiversity hot spots contributing to the World's biological resources from the long stretches of Eastern Ghats on the East, the greater Himalaya range on the Northern Plains and Western Ghats on the west. The Eastern Ghats range is unique in its own way to host many valuable flora and fauna from time immemorial. The Eastern Ghats are located between 77° 22' and 85°20' longitude and 11°30' and 20°00' N latitude(Fig.1). The Eastern Ghats, unlike the Western Ghats, are not a continuous range of mountains but a series of broken and weathered relicts of the Peninsular Plateau represented as a series of isolated hills and much of the Ghats is of lower altitude than Western Ghats. Beginning in North Orissa, they pass through the coastal region of Andhra Pradesh to Tamil Nadu cutting across Karnataka. Their average elevation is about 610 m. The Eastern Ghats are spread over four states from the Northeast to southwest along the east coast, covering an area of about 75,000 km with an average width of 200 km in the north and 100 km in the south (Bhairavamurthy, 1982). The average rainfall ranges from 1200 mm to 1500 mm, which is less than that in Western Ghats. The mean minimum temperature varies widely from 21^{0}C and 26 ^{0}C (Dani 1982). Because of their lower elevation and their broken character, traversing across the Eastern Ghats is much easier.

The review of literature indicates that very limited information is available on fish germplasm resources of the Eastern Ghats region and many areas have not been studied thoroughly (Rema Devi and Indra 2003). The only comprehensive account of the fishes of the Eastern Ghats is that of Menon (1951) based on his extensive surveys and earlier reports (Day, 1878; Misra 1938; Hora 1938; Hora 1940, Chauhan 1947). The major areas surveyed by different worker include Orissa hills, drainages below the Krishna river, Bailadila range of Baster, headwaters of Mahanadi, Simlipal hills of OrissaJavadi hills, Araku valley of Andhra Pradesh. Menon (1951) recorded 119 fish species and his study rendered substantial support to Hora's Satpura Hypothesis. He observed a total absence of Malayan elements in the fish fauna of the Eastern Ghats and also absence of species endemicity. After 1951 few authors worked on some selected areas of Eastern Ghats and these are Venkatateswaralu and Bakde 1986; Lazarus *et al.* 1988, Devi and Menon 1995, Devi and Raghunathan 1999, Devi and Indra 2003). Report of the Arunachalam and Johnson (1999) indicate distribution of barb *Barbodes carnaticus*(Cyprinidae: Cypriniformes) from the streams of Eastern Ghats of Tamil Nadu which showing affinities between Western Ghat and Eastern Ghats of Tamilnadu. Prasad and Rao(1999) on the fishes from the Hill streams of Araku, Andhra Pradesh, recorded 11 species. It is a well-recognized fact that there has been drastic reduction in abundance of the freshwater fishes in the region due to destruction of habitat, overexploitation and other anthropogenic effects. The stretch of Eastern Ghats has numerous features of ecological importance but unfortunately less attention has been given to Eastern Ghats as compared to Western Ghats. Therefore, in the present communication, an attempt has been made to synthesize the existing reports and to prioritize species based on their potential for culture, food, aquarium and sport value so that effective strategies can be made for their conservation and sustainable utilization. The conservation status of the fish fauna was also evaluated on the basis of available literature and CAMP report (1998).

Aquatic Resources

The Eastern Ghats are 'Tors' of geological antiquity with isolated mountain ranges lying between Mahanadi and Vaigai rivers of Peninsular India (Pullaiah 2006). The stretch of Eastern Ghats from Orissa, through Andhra Pradesh to Tamilnadu has numerous features of ecological significance. The aquatic resources of Eastern Ghat India comprising of eastern border of the Peninsular Plateau, extending from the extreme northeast to the south of the Chota-Nagpur Plateau and ending in the extreme southwest end of the Peninsula. In the south, the Eastern Ghat merge with the Western Ghats and the eastern parts of the Nilgiri, Anamalai



and Palani Hills also form parts of the Eastern Ghats. Drainage pattern of the Eastern Ghats area in Tamilnadu can be divided in to four basins like Araniyar, Palar, Ponniyar and Cauvery. According to Menon(1951) the spread of the fish fauna to the Orissa Hills and the Eastern Ghats from the Satpura and Western Ghats, especially the northern portion of it, seems to have been brought about by the earth movements that affected Peninsular India and subsequently reversed the north western drainage of the Godavari and the Mahanadi.

Diversity of Fish Fauna

The rivers and streams originating from the Eastern Ghats harbour many important fishes. The region shares its fish fauna predominantly with that of Gangetic plains rather than fish fauna of Western Ghats. The report published by Devi and Indra (2003) indicates distribution of 127 fish species from the region. In this paper, a revised compilation of 134 species including 6 exotic species belonging to 26 families under 67 genera have been presented based on published literature and internet sources alongwith maximum size, categorization as per uses (food, aquarium, sport etc.) and conservation status (Table 1). The taxonomic descriptions and biological features followed Jayaram(1999) and Menon(1999) and Talwar and Jhingran(1991). *Barbodes carnaticus* reported by Arunachalam and Johnson (1999), which was not included in the earlier list, has been added in the present compilation. The six exotic species reported in this region include *Oreochromis mossambica* (Peters), *Oreochromis niloticus* (Hassenquist), *Gambusia affinis* (Baird and Girard), *Poecilia reticulate* (Peters), *Hypophthalmichthys molitrix* (Val) and *Carassius carassius* (Linn.) Many more species including new species could be distributed in the aquatic resources of the Eastern Ghats. As far as endemicity is concerned , the region contributes one species which has been reported as endemic (*Lepidicephalus coromandalensis* (Menon1951). According to Menon ,"the absence of any endemicity in the fish fauna of the Eastern Ghats strongly supports the view that tilting of the Peninsular and the consequent reversal of drainages has occurred only during comparatively recent times in the geological history and sufficient time has not yet elapsed since the colonization of fishes in the hills in the hills of the Eastern Ghats for further speciation to take place".

Economically Important Fishes

The literature reveals that except taxonomic description of the fish species of the region, no consolidated report of potentially important food, ornamental and sport fishes distributed to the region has been published so far. With emerging demand of fish for consumption, aquarium and sport, it is important to evaluate species on the basis of different criteria's. Such a compilation is essential for the scientists and governmental agencies for research and development and also conservation. The methodologies for adopting criteria were followed as per Sarkar and Ponniah (2000). Our preliminary evaluation of the Eastern Ghat fish diversity reveals that out of 128 native species, 14 are considered as only food fish followed by 9 as only ornamental. About 40 species may be considered as food and ornamental whereas 19 species are considered as both food, cultivable and ornamental value. The species wise information of all the reported fish from Eastern Ghats have been presented in Table 1.

Conservation Status

As per Conservation Assessment and Management Plan Report (1998), out of 128 fish species, 1 was categorized as critically endangered (CR), 40 endangered (EN), 19 vulnerable (VU), 2 data deficient (DD), 13 lower risk (9 LR-lc, 4LR-nt) and about 53 species were not evaluated (NE). However, the categorization of the CAMP needs further validation to confirm their current status on the basis of latest information on distribution and abundance of concerned species. Further, the species composition of a particular waterbody stretch studied earlier, requires reassessment by surveys. One species distributed in the Eastern Ghat region namely *Macrognathus aral* (Bloch and Schneider) have found place in the World Conservation Union Red list (2006). Another species *Amblyceps mangois* (Hamilton) have been reported as a threatened fishes of the world (Prasad *et al.* 1997).

Conclusions

The inland water bodies of Eastern Ghats have undergone major changes during the past few years through deforestation and other human activities. These changes have brought about the endangering of several species of fish. Limitations of data on the distribution of fish species in the habitats with reference to seasonality and location are the major lacunae in ascertaining their current conservation status in the region. The conservation of aquatic biodiversity is not only important for preservation by way of a gene bank but also for the protection of existing germplasm resources from further degradation. Therefore, it is necessary to plan for long term collaborative projects so that extensive inventory can be made to collect data on biological aspects. The Wildlife (protection) Act of 1972 provided for the formation of several Protected Areas (National Parks, Sanctuaries) in India and there are 12 Wildlife sanctuaries in Eastern Ghats, three in Orissa, seven in Andhra Pradesh and

two in Tamilnadu. However, these are primarily for the protection of terrestrial animals and birds and the question of affording protection for fish has not so far received the attention it urgently requires. The NBFGR's conservation research strategies can be utilized as an anchor for decision-making process related to fish biodiversity conservation, management and development. It is hoped that collaborative research strategies projected in the future plan proposals will certainly give more comprehensive treasure of information with respect to conservation of fish fauna in the Eastern Ghat Region.

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Table : 1

[Species wise information of all the reported fish from Eastern Ghats]

Sl. No.	Species	Family	Max. size (TL in mm)	Conservation status	Category
1.	*Notopterus notopterus* (Pallas)	Notopteridae	180	LR-nt	F,A,H.P.,Cult
2.	*Chitala chitala* (Hamilton)	Notopteridae	1220	LR-nt	F, A, H.P., Cult
3.	*Anguilla bengalensis* (Gray)	Anguillidae	1200	EN	F, A. H.P.
4.	*Gudusia chapra* (Hamilton)	Clupeidae	150	LR-lc	F, A, H.P.
5.	*Goniolosa manmina* (Hamilton)	Clupeidae	1150	Vu	F, A
6.	*Securicula gora* (Hamilton)	Cyprinidae	230	NE	F
7.	*Salmostoma bacaila* (Hamilton)	Cyprinidae	106	LR-lc	A
8.	*Salmostoma boopis* (Day)	Cyprinidae	120	NE	F, A
9.	*Salmostoma clupeoides* (Bloch)	Cyprinidae	150	LR-lc	F
10.	*Salmostoma phulo* (Hamilton)	Cyprinidae	120	NE	F, A
11.	*Salmostoma untrahi* (Day)	Cyprinidae	200	NE	F
12.	*Aspidoparia morar* (Hamilton)	Cyprinidae	177	LR-nt	F, A, H.P.
13.	*Barilius barna* (Hamilton)	Cyprinidae	130	LR-nt	F, A
14.	*Barilius barila* (Hamilton)	Cyprinidae	100	LR-nt	F, A
15.	*Barilius bendelsis* (Hamilton)	Cyprinidae	135	NE	F, A
16.	*Barilius bola* (Hamilton)	Cyprinidae	304	Vu	F, S
17.	*Brachydanio rerio* (Hamilton)	Cyprinidae	40	LR-nt	A
18.	*Chela cachius* (Hamilton)	Cyprinidae	60	NE	A
19.	*Chela laubuca* (Hamilton)	Cyprinidae	85	LR-lc	F, A
20.	*Esomus barbatus* (Jerdon)	Cyprinidae	120	NE	F, A
21.	*Esomus dancricus* (Hamilton)	Cyprinidae	80	LR-lc	A, F
22.	*Esomus thermoicos* (Swainson)	Cyprinidae	120	NE	F, A
23.	*Danio malabaricus* (Jerdon)	Cyprinidae	120	NE	A, F
24.	*Danio aequipinnatus* (Mc Cl)	Cyprinidae	152	LR-nt	A, Cult.
25.	*Danio devario* (Hamilton)	Cyprinidae	120	LR-nt	A, Cult.
26.	*Rasbora caverii* (Jerdon)	Cyprinidae	70	NE	F, A
27.	*Rasbora daniconius* (Hamilton)	Cyprinidae	100	NE	F, A
28.	*Rasbora rasbora* (Hamilton)	Cyprinidae	130	NE	F, A
29.	*Amblypharyngodon microlepis* (Bleeker)	Cyprinidae	100	NE	F, A
30.	*Amblypharyngodon mola* (Ham-Buch)	Cyprinidae	200	LR-lc	F, A
31.	*Tor khudree* (Sykes)	Cyprinidae	460	Vu	F, S, Cult.
32.	*Osteobrama cotio* (Hamilton)	Cyprinidae	152	LR-nt	F
33.	*Osteobrama cotio cunma* (Day)	Cyprinidae	150	Vu	F
34.	*Osteobrama neilli* (Day)	Cyprinidae	130	NE	F, H.P., Cult.
35.	*Osteobrama vigorsii* (Sykes)	Cyprinidae	230	NE	F, A
36.	*Chagunius chagunio* (Hamilton)	Cyprinidae	457	NE	F, H.P.
37.	*Oreichthys cosuatis* (Hamilton)	Cyprinidae	80	NE	F, A
38.	*Puntius amphibius* (Val)	Cyprinidae	200	NE	F, A, Cult.
39.	*Puntius ambassis* (Day)	Cyprinidae	75	NE	A
40.	*Puntius bimaculatus* (Bleeker)	Cyprinidae	60	NE	F, A
41.	*Puntius chola* (Hamilton)	Cyprinidae	125	Vu	F, A, H.P.
42.	*Puntius conchonius* (Hamilton)	Cyprinidae	80	Vu	F, A
43.	*Puntius dorsalis* (Jerdon)	Cyprinidae	240	EN	A
44.	*Puntius filamentosus* (Val)	Cyprinidae	175	NE	F, A, Cult.
45.	*Puntius gelius* (Hamilton)	Cyprinidae	40	NE	F, Cult.

Sl. No.	Species	Family	Max. size (TL in mm)	Conservation status	Category
46.	*Puntius guganio* (Hamilton)	Cyprinidae	80	LRnt	F, A
47.	*Puntius melanampyx* (Day)	Cyprinidae	75	LR-lc	A
48.	*Puntius phutunio* (Hamilton)	Cyprinidae	95	LR-lc	F, A
49.	*Puntius sarana sarana* (Hamilton)	Cyprinidae	304	Vu	F, H.P., Cult.
50.	*Puntius sarana subnasutus*	Cyprinidae	310	NE	F, A, Cult.
51.	*Puntius sophore* (Hamilton)	Cyprinidae	127	LRnt	F, H.P., Cult.
52.	*Puntius terio* (Hamilton)	Cyprinidae	102	LRnt	A, H.P.
53.	*Puntius ticto* (Hamilton)	Cyprinidae	201	LRnt	F, A, Cult.
54.	*Puntius vittatus* (Day)	Cyprinidae	32	Vu/N	F, A, Cult.
55.	*Barbodes carnaticus* (Jerdon)	Cyprinidae	>600, 12 Kg	LRnt	F, A, Cult.
56.	*Cirrhinus fulungee* (Sykes)	Cyprinidae	300	LRnt	F, A
57.	*Cirrhinus mrigala* (Hamilton)	Cyprinidae	914	LRnt	F, H.P., Cult.
58.	*Cirrhinus reba* (Hamilton)	Cyprinidae	304	Vu	F, H.P., Cult.
59.	*Catla catla* (Hamilton)	Cyprinidae	1828	Vu	F, H.P., Cult.
60.	*Labeo angra* (Hamilton)	Cyprinidae	220	LRnt	A
61.	*Labeo ariza* (Hamilton)	Cyprinidae	560	CR	F, Cult.
62.	*Labeo bata* (Hamilton)	Cyprinidae	609	LRnt	F, H.P., Cult.
63.	*Labeo boggut* (Sykes)	Cyprinidae	200	NE	F, A, Cult.
64.	*Labeo calbasu* (Hamilton)	Cyprinidae	914	LRnt	F, H.P., Cult.
65.	*Labeo fimbriatus* (Bloch)	Cyprinidae	910	LRnt	F, A, Cult.
66.	*Labeo rohita* (Hamilton)	Cyprinidae	1000	LRnt	F, H.P., Cult.
67.	*Labeo gonius* (Hamilton)	Cyprinidae	1524	LRnt	F, H.P., Cult.
68.	*Garra mullya* (Sykes)	Cyprinidae	170	NE	F, A
69.	*Crossocheilus latius latius* (Hamilton)	Cyprinidae	130	DD	F, A
70.	*Parapsylorhynchus tentaculatus* (Annadale)	Parapsylorhynchidae	45	NE	F, A
71.	*Acanthocobitis botia* (Hamilton)	Balitoridae	60	LRnt	A
72.	*Acanthocobitis moreh* (Sykes)	Balitoridae	50	NE	F
73.	*Schistura denisoni denisoni* (Day)	Balitoridae	50	NE	A
74.	*Oreonectes (Indoreonectes) evezardi* (Day)	Balitoridae	38	NE	F, A
75.	*Schistura denisoni dayi* (Hora)	Balitoridae	73.5	NE	A
76.	*Lepidocephalus guntea* (Hamilton)	Cobitidae	96	NE	F, A
77.	*Lepidocephalus thermalis* (Val)	Cobitidae	80	NE	F, A
78.	*Lepidocephalus coromandelensis* (Menon)	Cobitidae	60	NE	F, A
79.	*Rita chrysea* (Day)	Bagridae	195	EN	F
80.	*Mystus armatus* (Day)	Bagridae	150	NE	F, A
81.	*Mystus cavasius* (Hamilton)	Bagridae	150	LRnt	F, H.P., Cult.
82.	*Mystus gulio* (Hamilton)	Bagridae	400	NE	F, A
83.	*Mystus menoda* (Hamilton)	Bagridae	300	NE	F, H.P.
84.	*Mystus montanus* (Jerdon)	Bagridae	90	Vu	F
85.	*Mystus tengara* (Bloch)	Bagridae	100	NE	F, H.P., Cult.
86.	*Mystus vittatus* (Bloch)	Bagridae	200	Vu	F, H.P., Cult.
87.	*Aorichthys aor* (Hamilton)	Bagridae	1080	NE	F
88.	*Aorichthys seenghala* (Sykes)	Bagridae	1050	NE	F, Cult.
89.	*Ompok bimaculatus* (Bloch)	Siluridae	457	EN	F, H.P., Cult.

Sl. No.	Species	Family	Max. size (TL in mm)	Conservation status	Category
90.	*Ompok pabda* (Hamilton)	Siluridae	172	EN	F, H.P., Cult.
91.	*Wallago attu* (Boch & Schneider)	Siluridae	2000	LRnt	F, H.P.
92.	*Ailia colia* (Hamilton)	Schilbeidae	177	Vu	F, A, H.P.
93.	*Pseudeutropius atherinoides* (Bloch)	Schilbeidae	150	EN/N	A
94.	*Neotropius khavalchor* (Kulkarni)	Schilbeidae	150	DD	F
95.	*Clupisoma garua* (Hamilton)	Schilbeidae	609	Vu	F
96.	*Mystus montanus* (Jerdon)	Bagridae	90	Vu	F
97.	*Eutropiichthys murius*	Schilbeidae	200	LRnt	H.P.
98.	*Eutropiichthys vacha* (Hamilton)	Schilbeidae	304	EN	F, H.P.
99.	*Pangasius pangasius* (Hamilton)	Pangasiidae	12	LRnt	F, A
100.	*Amblyceps mangois* (Hamilton)	Amblycipitidae	125	LRnt	A
101.	*Bagarius bagarius* (Hamilton)	Sisoridae	1524	Vu	F
102.	*Gagata cenia* (Hamilton)	Sisoridae	150	NE	F, A
103.	*Nangra itchkea* (Sykes)	Sisoridae	76	NE	F
104.	*Hara hara* (Hamilton)	Sisoridae	27	NE	F, A
105.	*Glyptothorax lonah* (Sykes)	Sisoridae	150	LRnt	F, A
106.	*Clarius batrachus* (Linnaeus)	Clariidae	290	Vu	F, H.P., Cult.
107.	*Heteropneustes fossilis* (Bloch)	Heteropneustidae	304	Vu	F, H.P., Cult.
108.	*Rhinomugil corsula* (Hamilton)	Mugliidae	450	NE	F
109.	*Oryzias melastigma* (Mc Cl.)	Adrianichthyidae	40	NE	F, A, Cult.
110.	*Xenontodon cancila* (Hamilton)	Belonidae	200	LRnt	A, H.P.
111.	*Aplocheilus panchax* (Hamilton)	Aplocheilidae	90	NE	F, A, Cult.
112.	*Monopterus cuchia* (Hamilton)	Synbranchidae	600	LRnt	F, A, Cult.
113.	*Macrognathus aral* (Bloch)	Mastacembalidae	193	LRnt	F, A, Cult.
114.	*Mastacembalus armatus* (Lacepede)	Mastacembalidae	460	NE	F, S, A
115.	*Mastacembalus panchalus* (Hamilton)	Mastacembalidae	180	NE	F, S, A
116.	*Chanda nama* (Hamilton)	Chanidae	110	NE	F, A
117.	*Parambassis baculis* (Hamilton)	Chanidae	60	LR-lc	F, A, Cult.
118.	*Parambassis ranga* (Hamilton)	Chanidae	93	NE	F, A, Cult.
119.	*Badis badis* (Hamilton)	Nandidae	90	NE	A
120.	*Nandus nandus* (Hamilton)	Nandidae	147	LRnt	F, A
121.	*Etroplus maculates* (Bloch)	Cichlidae	80	NE	F, A
122.	*Glossogobius giuris* (Hamilton)	Gobiidae	300	LRnt	A
123.	*Sicyopterus griseus* (Day)	Gobiidae	65	NE	F, A
124.	*Anabas testudineus* (Bloch)	Anabantidae	115	Vu	F, H.P., Cult.
125.	*Channa marulius* (Hamilton)	Anabantidae	245	LR-nt	F, A, Cult.
126.	*Channa orientalis* (Bl & Sch)	Anabantidae	145	Vu	F, A, Cult.
127.	*Channa punctatus* (Bloch)	Anabantidae	304	LR-nt	F, A, Cult.
128.	*Channa striatus* (Bloch)	Anabantidae	193	LR-nt	F, A, H.P.

F= Food; **S**= Sport; **A**= Aquarium; **H.P.** = Highly Priced; **Cult.** = Cultivable; **CR**= Critically endangered; **EN**= Endangered; **Vu**= Vulnerable; **LRnt**= Lower risk near threatened; **LRlc**= Lower risk least concern; **NE**= Not evaluated; **DD**= Data deficient

Studies on Fish Diversity in the streams in Nallamalai Hill Range, A component of the Eastern Ghats in Andhra Pradesh

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[Source : Proceedings of the National Seminar on Conservation of Eastern Ghats, 2002]

Introduction

Ecological studies focussing on patterns of biodiversity are a vital foundation for natural resource management and conservation (Katerina *et al.*, 1996). The present study on the fish diversity in the water bodies in the Nallamalai Hill range (78 ^{o}45'-80 ^{o}15'E and 15 ^{o}-30'-16 ^{o}45'N) an unexplored area is carried out with a view to prepare an inventory of the species of fish to help in conservation and management of the fish resources. Nallamalai hill range is formed during post-miocene period as an eastern part of the Cuddapah basin (Vidyanandan, 1964) and represents a portion of the Eastern Ghats in Andhra Pradesh. Seasonal streams, rivulets traverse the hill range and join to form two major streams Gundlakamma in the northern part of the part and Paleru in the middle region. The objective of the present study is to prepare an inventory of the species of fish inhabiting the water bodies in Nallamalai region and to understand the fish diversity in the two major streams, Gundlakamma and Paleru.

Material and Methods

Fish samples were collected from the sampling centres at Arthavedu, Cumbum, Markapuram, Y.Palem, Pullalacheruvu, Addanki, Podili, Pamoor, Kanigiri and Kandukuru along the streams Gundlakamma and Paleru during pre-monsoon, monsoon and post-monsoon periods. Fishermen capture the fish with dragnets, hook and line. They employ at some places destructive fishing using explosives. Fish collected during sampling were preserved in 10 per cent formalin and were identified following Jayaram (1981) and Talwar and Jhingran (1997).

Results and Discussion

Study area:

Nallamalai Hill range a portion of the Eastern Ghats in Andhra Pradesh in the districts of Prakasam and Nellore is located at an altitude between 500 to 700 m above mean sea level (MSL). Seasonal streams, rivulets, small pools are present in the hill ranges. The Hill range slopes towards east the coastal plains. These seasonal streams, rivulets join into major perennial streams, Gundlakamma and Paleru which flow into the plains and join Bay of Bengal.

The catchment area c.f. 10,000 Sq.Km. receive rain full during South-West monsoon period. During this period, the streams flow to their full capacity. In the post-monsoon months, rivulets in the head water regions of these streams become dry and water is restricted to pools and shallow tanks along the course of the streams.

The small rivulets Teegaleru, Duvvuleru join to form the major stream Gundlakamma, while Dommaleru and Makeru join to form Paleru

Fish fauna:

From different sampling centres located the along the course of the streams in the head waters and coastal plains, 45 species of fish have been collected (Table 1). Of these five species are collected from the sampling centre located in plains and nearer the sea. These five species are present in near coastal waters and migrate in to lower reaches of the streams during pre-monsoon period, when these areas have low saline conditions. These include *Anguilla bicolor bicolor, Therapon jarbua, Gerres filamentosus, Scatophagus argus* and *Elotris fusca.*

Table 1. List of Fishes Collected from the Water Bodies in Nallamalai Hill Range

1. *Notopterus notopterus* (Pallas)
2. *Anguilla bicolor bicolor* (Mc Clelland)
3. *Catla catla* (Hamilton)
4. *Cirrhinus reba* (Hamilton)
5. *Labeo boggut* (Sykes)
6. *Labeo fimbriatus* (Bloch)
7. *Puntius bimaculatus* (Bleeker)
8. *Puntius chola* (Hamilton)
9. *Puntius conchonius* (Hamilton)
10. *Puntius dorsalis* (Jerdon)
11. *Puntius filamentosus* (Valenciennes)
12. *Puntius parrah* Day
13. *Puntius sarana sarana* (Hamilton)
14. *Puntius stigma* (Day)
15. *Puntius ticto* (Hamilton)
16. *Salmostoma clupeoides* (Bloch)
17. *Danio aequipinnata* (Mc Clelland)
18. *Danio deuario* (Hamilton)
19. *Esomus barbatus* (Jerdon)

20. *Esomus danricus* (Hamilton)
21. *Parluciosoma daniconius* (Hamilton)
22. *Garra mullya* (Sykes)
23. *Lepidocephalus guntea* (Hamilton)
24. *Mystus cavasius* (Hamilton)
25. *Mystus gulio* (Hamilton)
26. *Mystus montanus* (Jerdon)
27. *Mystus vitatus* (Bloch)
28. *Ompok pabda* (Hamilton)
29. *Wallago attu* (Schneider)
30. *Pseudotropius atherinoides* (Bloch)
31. *Heteropneustes fossilis* (Bloch)
32. *Terapon jarbua* (Forsskal)
33. *Gerres filamentosus* Cuvier
34. *Scatophagus argus* (Linneaus)
35. *Etroplus maculatus* (Bloch)
36. *Etroplus suratenis* (Bloch)
37. *Mugil cephalus* (Linneaus)
38. *Glossogobius giuris* (Linneaus)
39. *Eleotris fusca* (Schneider)
40. *Awnabas testudineus* (Bloch)
41. *Colisa fasciatus* (Schneider)
42. *Channa orientalis* (Bloch and Schneider)
43. *Channa punctatus* (Bloch)
44. *Macrognathus aral* (Bloch and Schneider)
45. *Mastacembelus armatus* (Lacepede)

THREATENED FISHES OF INDIA [PDF FILE]
Source - http://www.wetlandsofindia.org/biodiversity/Appendix%204.pdf

Of the other 40 species, order Cypriniformes (carps, minnows loaches) is represented by 21 species. Fishes of the family Cyprinidae were found to be dominant with 20 species. Genus *Puntius* is represented by nine species and showed wide diversity. Of the nine species of *Puntius, P. bimaculatus* (Bleeker, 1844) is reported only from Sri Lanka (Talwar and Jhingran, 1991) and is recorded in the present collections.

Eight species of catfishes (Siluriformes), six species of perches (Perciformes) and two species of murrels and (channiformes) are recorded from the water bodies. The study shows that the cyprinids formed the dominant group in these water bodies, with wide diversity.

Fish Diversity:

Data collected during the study period, from all the sampling centres, was utilised to estimate the fish diversity in the two major streams, Gundlakamma and Paleru. From the seasonal streams rivulets joining Gundlakamma 25 species of fish belonging to 15 genera and included under five families were collected. From the stream Paleru and its associated water bodies 33 species of fish belonging to 21 genera included under 11 families were collected. Of these 18 species are common to both streams.

Based on the data collected from all sampling centres along the streams Gundlakamma and Paleru species diversity index (Menhenick, 1964) and species richness index (Margalef, 1966) were estimated separately for the two streams (Ramade, 1981). A comparison of the index values (Table 2) indicates that the stream Paleru shows greater fish faunal diversity than Gundlakamma. Diversity characterises a community of organisms. It is a measure of the degree of organisational complexity in the ecosystem and also the complexity of food webs (Ramade, 1981). Species diversity index, as also the species richness index for the stream Paleru is higher, indicating the presence of greater number of ecological niche in this stream sustaining the diverse fish community.

Fish Diversity Index Values in the Two Streams in Nallamalai Hills

	Gundlakamma	Paleru
Species Diversity Index (Menhenick, 1964)	3.251	5.779
Species richness index (Margalef, 1966)	2.467	4.119

Acknowledgements

The authors express their gratitude to the authorities of Nagarjuna University for providing the facilities to carry out the work.

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Abstracts and News items

An updated checklist of Ichthyofauna of Eastern Ghats
Rema Devi K and Indra TJ (2003) Zoos' Print Journal 18(4): 1067-1070.

Updated information on ichthyofaunal species composition of the Eastern Ghats is provided. They belong to 127 species (including 2 subspecies) under 26 families and nine orders. Absence of typical Malayan elements and few endemics characterise the fauna of the Eastern Ghats in contrast to the presence of several Malayan elements and more than 50% endemics among the Western Ghats Ichthyofauna.

Experience Brief for Chilika Lake Orissa, India.
Ghosh Asish (2003) Center for Environment and Development.
Web source: http://www.worldlakes.org

The Lake Chilika, Asia's biggest salt water lake in the eastern coast of India has a long history spanning over more than five thousand years. The Lake, (19°28' - 19°54' N latitude and 85°05' - 85°38'E longitude), located in the east coast of state of Orissa, India is the largest lagoon in Asia. Spread over three coastal districts of the state viz., Puri, Khurda and Ganjam, the lake covers an area of 1165 sq. km., in monsoon and 906 sq. km in summer. The faunal diversity of Chilika lake was first studied between 1915-1924 by Annandale and his group of scientists, from Indian Museum and Zoological Survey of India. The results of the study indicate nearly 600 species in the aquatic, island and shore areas of the lake; the past records of 428 species shows a positive trend of species diversity but earlier investigation on Platyhelminthes, Polychaetes, Birds have never been carried out systematically. It is noted that at least three species of brackish water porifera disappeared during 60 years as also a number of crustaceans (Brachyura and Decapods); of the 74 species of molluscs at least 50 species could not be traced during these year long surveys although total number of species increased to 87. Of the 69 species of fishes recorded from the lake during 1980's, 24 species were freshwater fishes – the decline in total fish diversity from 217 species recorded earlier to 69 is perhaps most startling. In general, while the lake has been or known as a type locality for nearly 30 species of crustacea and 60 species of mollusks besides some other in the past, the profile of species diversity positively changed over 60 years; it may be noteworthy that even in 1980's, eight new species of Platyhelminthes and five species of Nematode have been discovered from the lagoon (Ghosh et al, 1995).

Effect of Shrimp Farming on Nitrogen Levels in the Waters of Kandaleru Creek, Andhra Pradesh.
Arasu ART, Gupta BP, Joseph KO, Krishnani KK and Muralidhar M (2003) Indian Journal of Fisheries. 50(3): 291-296.

Shrimp farming is a rapidly growing and economically attractive industry in many tropical nations. In India, many shrimp farms mushroomed haphazardly all along the coast. Production of shrimp is often limited by deterioration of water quality, as discharge from aqua farms ultimately reach the receiving waters such as rivers, creeks, estuaries and sea or land. Shrimp farms are generally developed in groups and in certain locations the inlet from one farm receives water from the outlet of nearby farm. When compared to other industries, pollution from aquaculture is negligible and its source is the nitrogenous excretory wastes of the cultured organisms, which may cause eutrophication in marine / estuarine systems. A case study was undertaken in Kandaleru creek area in Nellore District of Andhra Pradesh, India in order to assess the nutrient release in terms of nitrogen, due to large scale shrimp farming and its impact on the creek evaluated. The changes in nitrogen levels are quite high and show a marked risk of eutrophication in the creek when semi-intensive shrimp farming is practiced in the area.

Important nesting habitats of olive ridley turtles *Lepidochelys olivacea* along the Andhra Pradesh coast of eastern India
Basudev Tripathy, Kartik Shanker and B. C. Choudhury

Olive ridley turtles *Lepidochelys olivacea* nest along the east and west coasts of India, with major mass nesting beaches in the state of Orissa. The coast of Andhra Pradesh, the state immediately south of Orissa has sporadic nesting of olive ridley turtles and is believed to form part of the migratory route of the turtles that nest in Orissa. A survey of nesting beaches and offshore waters of the Andhra Pradesh coast was carried out from November 2000 to April 2001. preliminary interviews and secondary data were used to determine potential nesting beaches. During January–March 2001intensive surveys of seven beaches and monthly surveys of the rest of the coast provided a lower bound of *c.* 4,000 nests along the Andhra Pradesh coast. Nesting densities were higher at beaches near river mouths, at 60–100 nests km-1 in northern and central Andhra Pradesh, and 15–20 nests km-1 in southern Andhra Pradesh. Sightings and incidental catch in experimental trawls indicated the presence of olive

ridley turtles in offshore waters. Fisheries related mortality is the major threat to the species, with nearly 1,000 dead turtles being washed ashore during January–March, but depredation of eggs by humans and feral animals was also widespread. Conservation efforts need to address these issues, and also the effects of coastal development and artificial illumination, especially at beaches that support relatively high densities of nesting olive ridley turtles.

Keywords Andhra Pradesh, bycatch, India, *Lepidochelys olivacea*, nest density, olive ridley turtle, Orissa.

Olive Ridley Turtle

Courtesy: www.guyana.org

Shrimp Farming Practices and its Socio-Economic Consequences in East Godavari District, Andhra Pradesh, India: A Case Study.

Kumaran M, Ravichandran P, Gupta BP and Nagavel A (2003) Aquaculture Asia VIII (3): 48-52.

Development of shrimp farming in the state of Andhra Pradesh, India grew at a phenomenal rate during the years 1990-1995. In 1990, a total of 6,000 ha was under shrimp farming and this rose to 88,300 ha during 1997-98. Presently about 78,700 hais under culture which accounts for more than 50 percent of the brackishwater area potentially available in the state. The average yield was around 1,000 kg/ha during 1990-1994. This dropped to about 550 kg/ha in 1995-96 and 630 kg/ha in 1998-99. The present study was carried out in East Godavari district of Andhra Pradesh to understand the nature of shrimp farming practices followed, its impact on the socioeconomic status of local population, the influence of extension support and the constraints if any faced by the farming community.

Cercaria chilkaensis No. 1, a new _cystophorous cercaria_ from the snail _Stenothyra blanfordiana_ from Chilka lake, India

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Source : Journal of Natural History Volume 24, Number 1, January-February 1990, pp. 261-270(10)

A new *cystophorous cercaria, Cercaria chilkaensis* No. 1 is described from the snail *Stenothyra blanfordiana* collected from Chilka lake (India). Its structure is compared with that of other cystophorous cercariae. A list of snail hosts of various cystophorous cercariae from different localities is included.

Rahaman, A.A. 1987. Ecosystem studies and management in the coastal belt of Cauvery delta at Muthupet, Tamil Nadu. ***In:*** Nair, N.B. (ed.). ***Proceedings of the National Seminar on Estuarine Management, June 4-5, 1987, Trivandrum***. pp. 168-171. [AVVM Sri Pushpam Coll., Dep. Zool., Poondi 613 530, India]
Source : http://www.fao.org

"Mangrove vegetation along the coastal belt of Cauvery delta (Tamil Nadu, India) and its role in the ecosystem was studied. Among macrofauna, the molluscs, shellfishes and finfishes were recorded, and the possibility for aquaculture is discussed. The author recommends an ecological regionalism, suggesting that every place in the coastal delta should develop the renewable resources necessary for its varied demands."

Foraminifera from the Chilka Lake on the east coast of India

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A total of sixtynine foraminiferal species belonging to 27 genera and 19 families have been identified from the sediment samples of the Chilka lake collected during three faunal surveys representing different seasons. *Miliammina fusca, Ammobaculites exiguus, Ammonia beccarii* (Linne) and *A. tepida* are the most abundant species in the fauna. A study of biofacies shows that the fauna is characterized by *Miliammina* in the inner lagoon fades and *by Ammonia beccarii* (Linne) in the outer lagoon/channel fades. During

premonsoon season, higher concentrations *of* total populations of Foraminifera and number of species have been observed due to its marine influence. Further, the fauna is a mixed assemblage due to incursion of the nearshore foraminiferids into it through the inlet by tidal currents. Faunal diversity, in general, increases seaward from the northern sector to the outer channel. Distribution patterns of Foraminifera are delineated, particularly in relation to their ecology. The fauna of the Chilka lake has been compared with that of certain Indian and overseas estuaries and most of the species reported in this paper are also known from the Indo-Pacific faunal province.

Dead Olive Ridleys Litter Orissa Beaches

Source: The Hindu, 1 February 2006.

The beaches of Orissa are again littered with dead olive ridleys despite efforts by many non-governmental agencies to prevent this. Around 2500 dead turtles have been washed ashore in the past few weeks after being killed by mechanised fishing boats. Dead turtles have been spotted at the mouths of the Devi and the Jatadhar rivers, Harishpur areas, Chilika coast and Puri. The largest of 891 turtles have been found dead between the Devi river mouth and Paradip. According to an estimate, more than 1,29,000 turtles have been found dead on the Orissa coast during the past 13 years.

A Philatelic Special Cover highlighting conservation of Olive Ridley Turtles, in Eastern Ghats Zone of Visakhapatnam - with Emphasis on Turtle Excluder Devices.

Rajashekar Tummala, rajtummala@rediffmail.com

Special Cover depicting endangered Olive Ridley Turtle (*Lepidochelys olivacea*) was issued Commemorating 42nd Vanya Prani Saptah Week on October 1, 1996, by the Andhra Pradesh Forest Department envisaging the conservation measures taken for protecting these attractive species, listed in the Schedule I of The Indian Wildlife Act, 1972.

This cover depicts endangered Olive Ridley Turtles found along the coast dotting the Yarada Hill Ranges of the Eastern Ghats, prominently along the Dolphin's Nose of Visakhapatnam. The cover emphasizes the importance assigned to these endangered species.

Incidentally, Visakhapatnam has highest density of the fishing vessels and it is necessary to ensure that these vessels are equipped with Turtle Excluder Devices (TEDS) so that the turtles make their exit from the fishing nets and thus conserved for posterity.

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1. Indian Wildlife Act, 1972

2. State of Environment Report of Andhra Pradesh, 2003 - EPTRI.

3. Secondary Data secured from Press clippings.

For further information :

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